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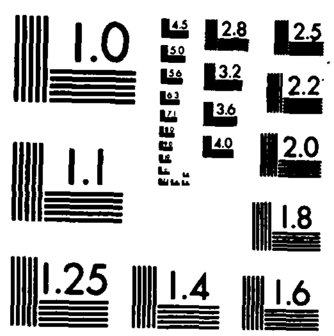

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CRC Report No. 539

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1983 CRC OCTANE NUMBER REQUIREMENT SURVEY

August 1983

COORDINATING RESEARCH COUNCIL, INC.
219 PERIMETER CENTER PARKWAY, ATLANTA, GEORGIA 30346

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1983 CRC OCTANE NUMBER REQUIREMENT SURVEY

(CRC PROJECT No. CM-123-83)

Prepared by the

1983 Analysis Panel

of the

CRC Octane Number Requirement Survey Group

DAAK-70-81-C-0128

August 1984

Light-Duty Vehicle Fuel, Lubricant, and Equipment Research Committee

of the

Coordinating Research Council, Inc.

ABSTRACT

In the 37th annual statistical survey of current model vehicles conducted by the Coordinating Research Council, Inc., test data were obtained on 383 1983 model vehicles, including 300 US vehicles and 83 imported vehicles. Fifteen laboratories participated in this Survey. Maximum octane number requirements were determined by testing under part-throttle conditions, as well as at maximum-throttle. Requirements are expressed as the Research octane number, Motor octane number, and (R+M)/2 octane number of the reference fuel which produced the least audible knock due to either spark or surface ignition, whichever was limiting. Estimated octane number requirements for the US vehicles are weighted in proportion to the 1983 vehicle model production figures and, for the imported models, in proportion to import sales volume in the United States.

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I. INTRODUCTION

I. INTRODUCTION

In the 37th annual statistical survey of current model vehicles conducted by the Coordinating Research Council, Inc., test data were obtained on 383 1983 model vehicles, including sixteen knock sensor-equipped vehicles and five select models of special interest. Maximum octane number requirements were determined by testing under part-throttle conditions, as well as at maximum-throttle.* Although octane number requirements were determined according to the 50th percentile acceleration technique in the 1981 and 1982 Surveys, this technique was deleted from the 1983 program. This was replaced by extended part-throttle investigation. Surface ignition was reported, if present.

Passenger cars and light-duty trucks including non-commercial vans (1/2-3/4 ton without four-wheel drive) were tested to represent the 1983 vehicle population in the United States. This year's Survey includes analyses for the following vehicle categories:

(1) US and Imported Vehicles -- 383 vehicles

(2) US and Imported Cars -- 359 cars

(3) US Vehicles -- 300 vehicles

(4) US Cars -- 283 cars

(5) Imported Vehicles -- 83 vehicles

It should be noted that the term "cars" designates passenger cars only, while the term "vehicles" includes passenger cars plus vans and light-duty trucks.

The order of testing reference fuels was the same as the 1982 Survey, which was as follows:

- Tank Fuel..1st
- High Sensitivity Full-Boiling Range Unleaded (FBRSU) Fuels....................................2nd
- Average Sensitivity Full-Boiling Range Unleaded (FBRU) Fuels......................................3rd
- Primary Reference (PR) Fuels.......................4th

Fifteen laboratories participated in this Survey; they are listed in Appendix A. Members of the CRC Octane Number Requirement Survey Analysis Panel are identified in Appendix B.

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* Maximum-throttle is either full-throttle for manual transmissions or widest throttle position for automatic transmissions that does not cause the transmission to downshift (detent) in each individual car.

II. SUMMARY

II. SUMMARY

A. Vehicles Tested

Data were collected on 383 1983 vehicles. These vehicles consisted of 300 US vehicles and 83 imported vehicles. There were 283 US and 76 imported passenger cars. The remainder consisted of seventeen US and seven imported light-duty trucks and vans. The 1983 Survey included sufficient data for five specific models which were analyzed separately as select models. All select models had automatic transmissions. The average deposit mileage in this Survey was 11,374. The weighted average engine displacement and compression ratio were 3.10 ℓ and 8.66, respectively. Sixteen vehicles were equipped with knock sensors.

B. Octane Number Requirements

Requirements are expressed as the Research octane number (RON), Motor octane number (MON), and (R+M)/2 octane number of the reference fuel which produced the least audible knock due to either spark or surface ignition, whichever was limiting. Estimated octane number requirements for the US vehicles are weighted in proportion to the 1983 vehicle model production figures and, for the imported models, in proportion to import sales volume in the United States.

For the 1981 and 1982 Surveys, knocking tendencies were investigated at maximum-throttle and by the 50th percentile acceleration technique. For the 1983 Survey, the 50th percentile acceleration technique was eliminated. Part-throttle requirements were defined when their requirements were higher than the maximum-throttle requirements or, with FBRU fuels only, when they were within four octane numbers of maximum-throttle requirements. The maximum requirements reported for the 1983 Survey were determined by the same method used in prior Surveys (the greater of maximum-throttle or part-throttle). Maximum (high borderline) and minimum (low borderline) octane number requirements were reported for the knock sensor-equipped vehicles when determined.

This is the first Survey in which requirements for knock sensor-equipped vehicles were included in the distribution. The base analysis case for this report uses the maximum (high borderline) octane number requirements of these vehicles. The following table for FBRU fuels presents maximum 1983 octane number requirements and changes from 1982 for the five sample categories, at the 50 percent and 90 percent satisfaction levels.

FBRU OCTANE NUMBER REQUIREMENTS

1983* AND CHANGES FROM 1982

Maximum Octane Number Requirements

Weighted Population	RON 50% Sat.	RON 90% Sat.	MON 50% Sat.	MON 90% Sat.
All US and Imported Vehicles	90.8	96.0	83.3	86.7
Δ from 1982	+1.2	+1.1	+0.7	+1.1
All US and Imported Cars	90.7	96.3	83.3	86.9
Δ from 1982	+1.0	+1.5	+0.7	+1.3
All US Vehicles	90.6	95.8	83.2	86.5
Δ from 1982	+1.0	+0.8	+0.6	+0.8
All US Cars	90.6	96.1	83.2	86.8
Δ from 1982	+0.9	+1.3	+0.6	+1.3
Imported Vehicles	91.3	96.5	83.7	87.0
Δ from 1982	+1.6	+1.8	+1.1	+1.5

* Note: 1983 data include the maximum (high borderline) requirements for knock sensor-equipped vehicles.

The following table illustrates the impact of knock sensor-equipped vehicles on the five weighted populations for the FBRU fuel series. At the current market penetration levels, inclusion of the knock sensor-equipped vehicles at their maximum (high borderline) requirement reduces the population requirements relative to those calculated by excluding knock sensors on the order of 0.1 RON at low satisfaction levels, and increases the requirements the same order at high satisfaction levels. Calculating the population requirements with the minimum (low borderline) knock-sensor requirements reduces the requirements 0.2 to 0.4 RON.

KNOCK-SENSOR IMPACT ON WEIGHTED POPULATION

FBRU RON REQUIREMENTS

RON Maximum Octane Number Requirements

Weighted Population		30% Sat.	50% Sat.	70% Sat.	90% Sat.
All US and Imported Vehicles	KS-H**	89.1	90.8	92.4	96.0
(5.96%)*	NKS	89.2	90.8	92.4	95.9
	KS-L	88.8	90.6	92.2	95.8
All US and Imported Cars	KS-H	89.1	90.7	92.5	96.3
(3.70%)	NKS	89.0	90.7	92.4	96.2
	KS-L	88.8	90.6	92.2	96.1
All US Vehicles	KS-H	89.0	90.6	92.2	95.8
(5.68%)	NKS	89.2	90.7	92.2	95.7
	KS-L	88.7	90.4	91.9	95.4
All US Cars	KS-H	89.1	90.6	92.3	96.1
(3.42%)	NKS	89.0	90.6	92.2	95.9
	KS-L	88.7	90.4	92.0	95.7
Imported Vehicles	KS-H	89.5	91.3	93.1	96.4
(0.28%)	NKS	89.4	91.3	93.0	96.3
	KS-L	-	-	-	-

---

* Knock sensors as normalized percent of total production for associated population.

** KS-H = Knock Sensors - Maximum (High Borderline) Requirement
NKS = No Knock Sensors
KS-L = Knock Sensors - Minimum (Low Borderline) Requirement

Maximum octane requirements for the select models at the 50 percent and 90 percent satisfaction levels for FBRU fuels are summarized on the next page.

SELECT MODELS

MAXIMUM FBRU OCTANE NUMBER REQUIREMENTS

Select Model	No. Tested	RON 50% Sat.	RON 90% Sat.	MON 50% Sat.	MON 90% Sat.
NGA 238A3/HGA 238A3/ IGA 238A3/LGA 238A3	18	91.9	99.6	84.1	89.4
NJP F20A3/LJP F20A3/ GLP F20A3	22	95.0	98.0	86.0	88.0
OA4 216A3/MA4 216A3	16	91.9	95.2	84.1	86.1
OD3 238A3/OD3 238A4/ MD3 238A3/OE3 238A3/ OE3 238A4/ME3 238A4	21	88.8	93.3	82.0	85.0
PKC 222A3/KKC 222A3/ DKC 222A3/KEC 222A3 DEC 222A3	21	89.6	95.5	82.5	86.5

C. Maximum Octane Number Requirements at Part-Throttle

Incidence of part-throttle knock with FBRU greater than maximum-throttle knock was slightly higher in 1983 than in 1982. Maximum requirements occurred at part-throttle in 16.4 percent of all 1983 model vehicles with FBRU fuels (63 of 383 vehicles), compared with 12.0 percent in 1982 and 9.8 percent in 1981.

D. Tank Fuel Knock Reported by Trained Raters

In the 1983 Survey, 44.6 percent of the weighted vehicle population knocked on tank fuel, which compares with 41.6 percent in the 1982 Survey and 42.9 percent in the 1981 Survey.

E. Surface Ignition

There were three reports of surface ignition in the 1983 Survey.

F. Road Octane Number Depreciation

Road octane number depreciation of FBRU fuels in the range 88 to 98 RON varied from 1.2 to 2.6, compared with 0.9 to 2.5 in the 1982 Survey. Depreciation of FBRSU fuels in the range of 88 to 99 RON varied from 2.0 to 3.9, compared with 2.3 to 4.1 in last year's Survey.

G. Speed Range Octane Number Requirements

Octane number requirements across engine speed range were determined on 225 vehicles with primary reference fuels.

H. Gear Position for Maximum Requirements

Of the 383 vehicles tested, 77 percent were equipped with automatic transmissions and 23 percent were equipped with manual transmissions. Maximum requirements at maximum-throttle occurred in 83.4 percent of automatic transmission vehicles (11.9 percent in fourth gear, 52.9 percent in third gear, and 18.6 percent in second gear). Maximum requirements at maximum-throttle occurred in 84.1 percent of manual transmission vehicles (67.1 percent in fourth gear, 15.9 percent in third gear, and 1.1 percent in second gear).

III. TEST VEHICLES

III. TEST VEHICLES

This year's Survey tested a total of 383 1983 model vehicles, compared with 438 vehicles in the 1982 Survey. The analysis of the data included 359 passenger cars (283 US and 76 imports) and 24 non-commercial vans and light-duty trucks (17 US and 7 imports). Also included are sixteen knock sensor-equipped vehicles (twelve US passenger cars, three US trucks, and one imported car).

A sufficient amount of data (sixteen or more vehicles) was obtained for five specific engine models which were analyzed as select models. All select models had automatic transmissions, as shown in Table I.

In the 1983 Survey, 77 percent of the transmissions were automatic. Three-quarters of the automatics were three-speed, and the rest four-speed. The manual transmissions were divided into one-fifth four-speed and four-fifths five-speed. Ninety percent of the surveyed vehicles were air-conditioned.

Table II shows the distribution of odometer mileage for both the 1982 and 1983 Surveys. The 1983 distribution is shown as a bar chart in Figure 1. The average odometer mileage was 11,374. The weighted average displacement in 1983 was 3.10 ℓ, compared with 2.94 in 1982. The weighted average compression ratio in 1983 was 8.66, compared with 8.58 in 1982.

The basic timing was adjusted to the manufacturers' recommended setting prior to testing. A total of fifty-three vehicles were adjusted; twenty-three were more than ± 2 degrees off from the manufacturers' setting. The number of vehicles and their deviation in spark setting are shown in Table III.

Participants were requested to rate specific vehicle models in a pattern which would minimize data bias due to differences in testing and vehicle sampling. The United States was divided into four geographical areas with the requested ratings for a given model divided among laboratories within each geographical area.

IV. REFERENCE FUELS

IV. REFERENCE FUELS

Three series of reference fuels were used in the 1983 Survey: primary reference (PR) fuels; average sensitivity full-boiling range unleaded (FBRU) reference fuels with sensitivities similar to those of normal commercial gasoline; and high-sensitivity full-boiling range unleaded (FBRSU) reference fuels with sensitivities higher than the FBRU fuels.

A. PR Fuels

Isooctane and normal heptane, meeting ASTM specifications, were blended in two octane number increments from 76 to 82 RON, and in one octane number increments from 82 to 100 RON.

B. FBRU Reference Fuels

FBRU fuels were prepared from three base blends (RMFD-344-83, RMFD-345-83, and RMFD-346-83) in two octane number increments from 78 to 84 RON, and in one octane number increments from 84 to 102 RON.

The base blends were prepared from normal refinery components. Inspection data furnished by the supplier are compared with those of the 1982 FBRU fuels in Appendix C, Table C-I. The physical inspections of the 1983 fuels were similar (in most instances) to those of the 1982 fuels; however, the aromatics content of the intermediate fuel is higher in 1983, while its saturates content is lower.

The composition and average laboratory octane data for the 1983 FBRU reference fuel series are presented in Appendix C, Table C-II, with the sensitivities compared with the 1982 fuels in Table C-III. The sensitivities of the 1983 fuels were similar to those of the 1982 fuels up to 90 octane, and had lower sensitivities than the 1982 fuels above 90 octane.

C. FBRSU Reference Fuels

FBRSU fuels were prepared from three base blends (RMFD-347-83, RMFD-348-83, and RMFD-349-83) in two octane number increments from 78 to 84 RON, and in one octane number increments from 84 to 102 RON.

The base blends were prepared from normal refinery components. Inspection data furnished by the supplier are compared with those of the 1982 base blends in Appendix C, Table C-IV.

The laboratory blending octane data for the 1983 FBRSU reference fuels are presented in Table C-V, with the sensitivities compared with the 1982 fuels in Table C-III. The sensitivities of the 1983 fuels were slightly lower than the 1982 fuels below 89 RON, and slighter higher above.

V. TEST TECHNIQUE

V. TEST TECHNIQUE

The test technique (CRC Designation E-15-83, Attachment 2 of Appendix D) specified that octane number requirements be determined at level road acceleration conditions. The order of fuel testing was tank fuel, FBRSU fuels, FBRU fuels, and PR fuels. Knocking tendencies were investigated using both maximum-throttle and part-throttle acceleration techniques. Part-throttle was investigated in each vehicle to determine if the part-throttle requirement was higher than the maximum maximum-throttle requirement. In these cases, the part-throttle requirement search was conducted with all three fuels. Part-throttle requirements were also determined with FBRU fuels down to four numbers below the maximum maximum-throttle requirements.

The 50th percentile acceleration technique, used in the 1981 and 1982 programs, was eliminated from the 1983 program.

The occurrence of other abnormal combustion noise, such as surface ignition, was also reported.

The octane number requirement of a vehicle is defined as the Research or Motor octane number of the highest octane test fuel producing borderline knock which is induced by spark or surface ignition. The maximum octane number requirement of the vehicle is defined as the highest requirement at maximum- or part-throttle. Maximum octane number requirements were obtained over the speed range with PR fuels only.

A modification of the E-15-83 technique was provided for vehicles equipped with knock sensors, and is appended to Attachment 2 of Appendix D. This technique identifies the highest octane fuel that gives borderline knock (maximum or high requirement) and the lowest octane fuel that gives borderline knock (minimum or low requirement).

VI. DISCUSSION OF RESULTS

VI. DISCUSSION OF RESULTS

A. General

Of the fifteen participating laboratories, four used level roads, ten used chassis dynamometers, and one laboratory used both. Sixty-seven percent of the cars were tested on chassis dynamometers.

Average test temperature was 72°F, with a barometric pressure average of 29.73 inches Hg and average humidity of 68.2 grains per pound. Test conditions for individual observations are reported in Appendix E.

B. Distribution of Maximum Octane Number Requirements

The octane number requirement data were used to prepare satisfaction curves and tables for the following samples of 1983 model vehicles: (1) US and Imported Vehicles; (2) US and Imported Cars; (3) US Vehicles; (4) US Cars; and (5) Imported Vehicles. Research and Motor octane number requirements for the five categories at 50 percent and 90 percent satisfaction are shown in Table IV. In preparing the curves and tables, the octane number requirement data were weighted in accordance with final 1983 model-year production data, and with US sales figures in the case of imports. Each curve and table, therefore, provides an estimate of the distribution of octane number requirements of the appropriate vehicle population on the road. The procedure for assigning weighting factors and for calculating the octane number requirement distributions is described in Appendix F.

Vehicles equipped with knock sensors were included in the 1983 models tested. The vehicles with knock sensors (knock-limiter devices) were tested for maximum (high borderline) octane number requirements and minimum (low borderline) octane number requirements. Octane number requirement distributions were calculated for each group of vehicles using the requirements from those vehicles with knock sensors rated at maximum (high borderline) requirement, with their ratings at minimum (low borderline) requirement, and with those vehicles with knock sensors excluded. The results are tabulated in Tables XXV through XXXIX. Maximum octane number requirements for the 1983 model vehicles were considered to be the requirements which included the knock sensor-equipped vehicles at the maximum (high borderline) requirement. The tabulated results of the individual knock sensor-equipped vehicles tested are reported in Appendix H.

1. US and Imported Vehicles

In the 1983 Survey, maximum octane number requirements were determined on 383 vehicles with FBRU fuels, and on 376 vehicles with FBRSU and PR fuels. Sixteen of the vehicles were equipped with knock sensors.

Maximum Research octane number requirements for all three reference fuels are shown in Figures 2a, 3a, 4a (rectangular coordinates) and 2b, 3b, 4b (probability plots). Each plot compares the requirements with knock-sensor ratings at the maximum (high borderline) level, at the minimum (low-borderline) level, and with knock sensor-equipped vehicles excluded. The maximum Research octane number requirements for all three reference fuels are plotted in Figures 5a (rectangular coordinates) and 5b (probability plot). The octane number requirement distributions for each case are very nearly the same. Maximum Research, Motor, and (R+M)/2 octane number requirements are listed in Table V. The 50 percent and 90 percent satisfaction level requirements are as follows:

MAXIMUM OCTANE NUMBER REQUIREMENTS

(US and Imported Vehicles)

Fuel	50% Satisfied RON	50% Satisfied MON	50% Satisfied (R+M)/2	90% Satisfied RON	90% Satisfied MON	90% Satisfied (R+M)/2
PR	89.4	89.4	89.4	93.6	93.6	93.6
FBRU	90.8	83.3	87.1	96.0	86.7	91.4
FBRSU	91.5	81.6	86.5	97.4	85.5	91.4

Comparisons of 1983 and 1982 Survey maximum Research, Motor, and (R+M)/2 octane number requirements are shown in Tables VI, VII, and VIII, respectively, for all three fuel series. Distributions of maximum RON requirements are shown in Figure 6 for PR fuels, Figure 7 for FBRU fuels, and Figure 8 for FBRSU fuels. The differences at the 50 percent and 90 percent satisfaction levels are summarized in the following table:

DIFFERENCES BETWEEN 1983 AND 1982 MAXIMUM OCTANE NUMBER REQUIREMENTS

(US and Imported Vehicles)

Fuel	50% Satisfied RON	50% Satisfied MON	50% Satisfied (R+M)/2	90% Satisfied RON	90% Satisfied MON	90% Satisfied (R+M)/2
PR	+0.6	+0.6	+0.6	+0.5	+0.5	+0.5
FBRU	+1.2	+0.7	+1.0	+1.1	+1.1	+1.1
FBRSU	+0.3	+0.1	+0.2	+0.9	+0.5	+0.6

Confidence limits for maximum octane number requirement distributions are given in Appendix G, Table G-I. The 95 percent confidence limits for Research octane number requirements varied from ±0.31 to ±0.46 at the 50 percent satisfaction level, and from ±0.42 to ±0.63 at the 90 percent satisfaction level.

2. US and Imported Cars

Maximum octane number requirements were determined on 359 US and imported cars with FBRU fuels, and on 352 cars in the case of FBRSU and PR fuels. Thirteen of the vehicles were equipped with knock sensors.

Maximum Research, Motor, and (R+M)/2 octane number requirements on all three fuel series are given in Table IX. The maximum Research octane number requirement distributions for all three reference fuels are plotted in Figures 9a (rectangular coordinates) and 9b (probability plot). Maximum octane number requirements at the 50 percent and 90 percent satisfaction levels are summarized in the following table:

MAXIMUM OCTANE NUMBER REQUIREMENTS

(US and Imported Cars)

Fuel	50% Satisfied RON	50% Satisfied MON	50% Satisfied (R+M)/2	90% Satisfied RON	90% Satisfied MON	90% Satisfied (R+M)/2
PR	89.3	89.3	89.3	93.8	93.8	93.8
FBRU	90.7	83.3	87.0	96.3	86.9	91.6
FBRSU	91.4	81.6	86.5	97.7	85.7	91.7

The maximum Research octane number requirements for 1983 US and imported cars are compared with 1982 model-year data in Table X for PR, FBRU, and FBRSU fuels. Corresponding comparisons of Motor and (R+M)/2 octane number requirements are given in Tables XI and XII, respectively. Differences between 1983 and 1982 data at the 50 percent and 90 percent satisfaction levels are as follows:

DIFFERENCES BETWEEN 1983 AND 1982 MAXIMUM OCTANE NUMBER REQUIREMENTS

(US and Imported Cars)

Fuel	50% Satisfied RON	50% Satisfied MON	50% Satisfied (R+M)/2	90% Satisfied RON	90% Satisfied MON	90% Satisfied (R+M)/2
PR	+0.6	+0.6	+0.6	+0.9	+0.9	+0.9
FBRU	+1.0	+0.7	+0.8	+1.5	+1.3	+1.4
FBRSU	+0.2	+0.1	+0.1	+1.0	+0.6	+0.8

Confidence limits for maximum octane number requirement distributions of 1983 US and imported cars are given in Appendix G, Table G-I. The 95 percent confidence limits for Research octane number requirements varied from ±0.34 to ±0.51 at the 50 percent satisfaction level, and from ±0.46 to ±0.69 at the 90 percent satisfaction level.

3. US Vehicles

Maximum octane number requirements were determined on 300 US vehicles with FBRU fuels, and on 293 vehicles with FBRSU and PR fuels.

Distributions of maximum Research octane number requirements are plotted in Figures 10a and 10b for the three fuel series. Research, Motor, and (R+M)/2 octane number requirements for the US vehicles are given in Table XIII. Octane number requirements at the 50 percent and 90 percent satisfaction levels are listed below:

MAXIMUM OCTANE NUMBER REQUIREMENTS

(US Vehicles)

Fuel	50% Satisfied RON	50% Satisfied MON	50% Satisfied (R+M)/2	90% Satisfied RON	90% Satisfied MON	90% Satisfied (R+M)/2
PR	89.0	89.0	89.0	92.7	92.7	92.7
FBRU	90.6	83.2	86.9	95.8	86.5	91.1
FBRSU	91.3	81.5	86.4	97.7	85.7	91.7

Comparisons of maximum octane number requirements of 1983 and 1982 US vehicles for the three fuel series are given in Tables XIV, XV, and XVI in terms of RON, MON, and (R+M)/2, respectively. Distributions of maximum Research octane number requireme-ts are shown in Figure 11 for PR fuels, in Figure 12 for FBRU fuels, and in Figure 13 for FBRSU fuels. Differences between octane number requirements of 1983 and 1982 US vehicles at the 50 percent and 90 percent satisfaction levels are given in the following table:

DIFFERENCES BETWEEN 1983 AND 1982 MAXIMUM OCTANE NUMBER REQUIREMENTS

(US Vehicles)

Fuel	50% Satisfied RON	50% Satisfied MON	50% Satisfied (R+M)/2	90% Satisfied RON	90% Satisfied MON	90% Satisfied (R+M)/2
PR	+0.4	+0.4	+0.4	0.0	0.0	0.0
FBRU	+1.0	+0.6	+0.8	+0.8	+0.8	+0.8
FBRSU	0.0	-0.1	0.0	+1.2	+0.8	+1.0

Confidence limits for maximum octane number requirement distributions of 1983 US vehicles are tabulated in Appendix G, Table G-I. The 95 percent confidence limits for Research octane number requirements were from ±0.34 to ±0.55 at the 50 percent satisfaction level, and from ±0.45 to ±0.74 at the 90 percent satisfaction level.

4. US Cars

Maximum octane number requirements were determined on 286 US cars with FBRU fuels, and on 279 cars with FBRSU and PR fuels.

Distributions at maximum Research octane number requirements are plotted in Figures 14a (rectangular coordinates) and 14b (probability plot) for the three fuel series. Maximum Research, Motor, and (R+M)/2 octane number requirements for all three fuel series are given in Table XVII, and summarized below for the 50 percent and 90 percent satisfaction levels:

MAXIMUM OCTANE NUMBER REQUIREMENTS

(US Cars)

Fuel	50% Satisfied RON	50% Satisfied MON	50% Satisfied (R+M)/2	90% Satisfied RON	90% Satisfied MON	90% Satisfied (R+M)/2
PR	88.9	88.9	88.9	92.7	92.7	92.7
FBRU	90.6	83.2	86.9	96.1	86.8	91.4
FBRSU	91.2	81.4	86.3	98.1	86.0	92.0

The maximum Research, Motor, and (R+M)/2 octane number requirements of US cars tested in the 1983 and 1982 Surveys are compared in Tables XVIII, XIX and XX, respectively, for all three fuel series. The differences at the 50 percent and 90 percent satisfaction levels are as follows:

DIFFERENCES BETWEEN 1983 AND 1982 MAXIMUM OCTANE NUMBER REQUIREMENTS

(US Cars)

Fuel	50% Satisfied RON	50% Satisfied MON	50% Satisfied (R+M)/2	90% Satisfied RON	90% Satisfied MON	90% Satisfied (R+M)/2
PR	+0.3	+0.3	+0.3	+0.3	+0.3	+0.3
FBRU	+0.9	+0.6	+0.7	+1.3	+1.3	+1.2
FBRSU	-0.1	-0.2	-0.2	+1.5	+1.0	+1.2

Confidence limits for maximum octane number requirement distributions of 1983 US cars are given in Appendix G, Table G-I. The 95 percent confidence limits for Research octane number requirements varied between ±0.37 and ±0.62 at the 50 percent satisfaction level, and between ±0.50 and ±0.83 at the 90 percent satisfaction level.

5. Imported Vehicles

Maximum octane number requirements were determined on eight-three imported vehicles with PR, FBRU, and FBRSU fuels. Maximum Research octane number requirements for all three reference fuel series are plotted in Figures 15a and 15b. Maximum octane number requirements in terms of RON, MON, and (R+M)/2 are given in Table XXI. The 50 percent and 90 percent satisfaction level maximum octane number requirements are listed in the following table:

MAXIMUM OCTANE NUMBER REQUIREMENTS

(Imported Vehicles)

	50% Satisfied			90% Satisfied		
Fuel	RON	MON	(R+M)/2	RON	MON	(R+M)/2
PR	90.4	90.4	90.4	96.3	96.3	96.3
FBRU	91.3	83.7	87.5	96.5	87.0	91.7
FBRSU	92.1	82.0	87.1	96.8	85.0	90.9

The maximum Research, Motor, and (R+M)/2 octane number requirements of imported vehicles in the 1983 and 1982 Surveys are compared in Tables XXII, XXIII, and XXIV, respectively, for all three fuel series. The differences at the 50 percent and 90 percent satisfaction levels are as follows:

DIFFERENCES BETWEEN 1983 AND 1982 MAXIMUM OCTANE NUMBER REQUIREMENTS

(Imported Vehicles)

	50% Satisfied			90% Satisfied		
Fuel	RON	MON	(R+M)/2	RON	MON	(R+M)/2
PR	+1.0	+1.0	+1.0	+2.2	+2.2	+2.2
FBRU	+1.6	+1.1	+1.3	+1.8	+1.5	+1.6
FBRSU	+1.2	+0.7	+1.0	0.0	-0.2	-0.1

Confidence limits for maximum octane number requirement distributions of 1983 imported vehicles are tabulated in Appendix G, Table G-I. The 95 percent confidence limits for Research octane number requirements were from ±0.86 to ±1.01 at the 50 percent satisfaction level, and from ±1.16 to ±1.36 at the 90 percent satisfaction level.

6. Maximum Requirements at Part-Throttle

The throttle positions for maximum octane number requirements of tested vehicles were reported as maximum-throttle or part-throttle. Maximum part-throttle requirements were defined when their requirements were higher than the maximum maximum-throttle requirements. The number and percentage of vehicles having FBRU part-throttle octane number requirements greater than maximum-throttle requirements are shown below, along with a comparison with the 1982 Survey. The percentages of all vehicles having maximum requirements at part-throttle were 16.4 percent in 1983, compared with 12.0 percent in 1982 and 9.8 percent in 1981.

VEHICLES HAVING FBRU PART-THROTTLE REQUIREMENTS
$>$ MAXIMUM-THROTTLE REQUIREMENTS

(1983 and 1982 US and Imported Vehicles)

	No. Vehicles Tested	No. of Vehicles	% of Vehicles
1983 US and Imported Vehicles	383	63	16.4
1982 US and Imported Vehicles	434	52	12.0

C. 1983 Part-Throttle Investigation

1. 50th Percentile Acceleration Technique

The 50th percentile acceleration technique, employed in the 1981 and 1982 Surveys, was discontinued for the 1983 Survey and replaced by an expanded search for part-throttle requirements, as described in the CRC E-15-83 Technique (Appendix D). Reference to the 50th percentile acceleration procedure may be found in the CRC E-15-83 Technique.

2. Part-Throttle Requirements

Of the 383 vehicles tested, 371 were tested for part-throttle requirements down to four octane numbers below maximum-throttle requirements with FBRU fuels. One of the part-throttle tested vehicles had a requirement below 78 RON, the lowest octane fuel available. Of the remaining, 71 vehicles (19 percent) had part-throttle requirements more than four octane numbers below the maximum-throttle requirements.

D. Select Models

Five select models, representing five engine-chassis combinations, were tested. The select models originally chosen for this year's Survey included one knock sensor-equipped model (see Appendix D, Table D-I); however, that model was tested without knock sensors since the manufacturer's production of that model was delayed. The delay in production precluded locating enough vehicles for testing with adequate mileage for stabilized octane number requirements. The identification and specifications of the engine-chassis combinations of the select models are given in Table I.

Maximum Research, Motor, and (R+M)/2 octane number requirements are shown for 50 percent and 90 percent satisfaction levels on PR, FBRU, and FBRSU fuels in Table XL. Maximum octane number requirements for each select model at various satisfaction levels are listed in Appendix I, Table I-I. Maximum Research, Motor, and (R+M)/2 octane number requirements for the individual cars of each select model are given in Table I-II.

Maximum Research octane number satisfaction curves for the five select models are shown in Figures 16 through 20 for all three fuel series. The data points plotted on the figures represent the maximum requirements obtained on FBRU reference fuels for individual cars. Each curve was constructed by use of the "Z" method, which is discussed in Appendix F. The 95 percent confidence limits for maximum requirements are shown in Appendix G, Table G-II.

E. Tank Fuel

As required by the program, tank fuel was tested for incidence of knock whenever an owners' questionnaire was obtained, although owners' questionnaires were required to be obtained only when the vehicle tested had a regular driver and the ignition timing did not have to be reset more than two degrees. To gain additional information, however, tank fuel ratings were made by many participants on many other vehicles which did not meet the restrictions listed.

1. Owner/Rater Comparison of Tank Fuel Knock

Although owners' questionnaires were obtained on a total of 149 vehicles, only 129 of these vehicles had both owner/rater tank fuel data with no change in spark timing. Of the 129 1983 vehicles, 59.7 percent were reported by trained raters to be knocking on tank fuel, whereas the owners reported 29.5 percent. This results in an owner/rater knock ratio of 0.49. The 59.7 percent of vehicles found to be knocking by trained raters in 1983 is higher than in the 1982 Survey. The owner/rater comparison of tank fuel knock data for 1983, along with previous Survey data back to 1976, is presented in Table XLI.

2. Objectionable Versus Unobjectionable Knock

Of the owners reporting knock with vehicles which had no change in spark timing, 42.1 percent found knock to be objectionable. This percentage of objectionable knock is lower than the 52.8 percent found in 1982, as shown in Table XLI.

3. Tank Fuel Knock Reported by Trained Raters

Tank fuel knock observations were reported by trained raters on 314 of the 383 test vehicles. The percentages of all 1983 vehicles and the select models knocking on tank fuel are shown in Table XLII. On a weighted basis, 44.6 percent of the 1983 vehicles tested knocked on tank fuel, compared with 41.6 percent in the 1982 Survey and 42.9 percent of the vehicles in the 1981 Survey. As shown in the table, two of the five select models tested had high knocking percentages of 75.0 and 90.9.

F. Surface Ignition

There were three reports of surface ignition in the 1983 Survey.

G. Engine Speed for Maximum Octane Number Requirements

Engine speeds at which maximum octane number requirements occurred for each select model are shown in Table XLIII for PR, FBRU, and FBRSU fuels. Weighted data for all 1983 vehicles are shown in Table XLIV and Figure 21.

H. Road Octane Number Depreciation of FBRU and FBRSU Fuels

Road octane number ratings and road octane number depreciation for FBRU and FBRSU fuels were determined from the octane number requirement data for all vehicles. The results are shown in Table XLV.

In this report, the road octane number rating of FBRU and FBRSU fuels is defined as the primary reference fuel octane level which satisfied the same percentage of vehicles. Depreciation values were established by subtracting the road octane number rating of the fuel from its Research octane number. Depreciation values of FBRU fuels in the range 88 to 98 RON varied from 1.2 to 2.6, compared with 0.9 to 2.5 in the 1982 Survey. Depreciation of FBRSU fuels in the range of 88 to 99 RON varied from 2.0 to 3.9, compared with 2.3 to 4.1 in last year's Survey.

I. Speed Range Octane Number Requirement

Primary reference fuel (PRF) octane number requirements were determined over a range of engine speeds from 1000 to 3750 rpm on 225 vehicles. Individual vehicle data are in Appendix J, Table J-I. For the five select models, speed range data were analyzed on 71 cars. The mean PRF octane number requirement, standard deviation, and number of observations within each speed range are in Table J-II. Mean PRF requirements for the five select models are plotted in Figures J-I through J-5.

J. Gear Position for Maximum Requirements

The throttle/gear position for maximum octane number requirements on FBRU fuels is shown in Appendix K. Of the 383 vehicles tested, 295 (77.0 percent) were equipped with automatic transmissions and 88 (23.0 percent) were equipped with manual transmissions.

Maximum requirements at maximum-throttle occurred in 83.4 percent of the automatic transmission vehicles (11.9 percent in fourth gear, 52.9 percent in third gear, and 18.6 percent in second gear). Maximum requirements at part-throttle occurred in 16.6 percent of the automatic transmission vehicles.

For manual transmission vehicles, 84.1 percent had maximum requirements at maximum-throttle (67.1 percent in fourth gear, 15.9 percent in third gear, and 1.1 percent in second gear). Maximum requirements at part-throttle occurred in 15.9 percent of manual transmission vehicles. Fifth gear for five-speed manual transmissions was not examined per program instructions.

T A B L E S

AND

F I G U R E S

TABLE I

1983 SELECT MODEL SPECIFICATIONS*

Model	Disp. ℓ	Engine Type	Brake HP	Carb. Bbl.	Comp. Ratio	Trans-mission
Chrysler Corporation:						
Aries/Reliant/LeBaron Dodge 600/E Class	2.2	L-4	94	2	9.0	Automatic
Ford Motor Company:						
Escort/Lynx (high output engine)	1.6	L-4	80	2	9.0	Automatic
Thunderbird/Cougar/ LTD/Marquis	3.8	V-6	110	2	8.6	Automatic
General Motors Corporation:						
Cavalier/Skyhawk/Cimarron	2.0	L-4	88	F.I.	9.3	Automatic
Monte Carlo/Bonneville/ Grand Prix/Cutlass/Regal	3.8	V-6	110	2	8.0	Automatic

* None of the select model cars tested were equipped with knock sensors.

TABLE II

DISTRIBUTION OF ODOMETER MILEAGE FOR TESTED VEHICLES

Mileage		No. of Vehicles Within Mileage Increments 1983 Vehicles	1982 Vehicles
0 - 1,999		0	0
2,000 - 3,999		0	0
4,000 - 5,999		28	44
6,000 - 7,999		88	111
8,000 - 9,999		69	66
10,000 - 11,999		63	63
12,000 - 13,999		44	46
14,000 - 15,999		26	26
16,000 - 17,999		25	39
18,000 - 19,999		12	12
20,000 - 24,999		22	20
25,000 - 29,999		3	6
30,000 +		3	1
	No. of Vehicles	383	434
	Average Mileage	11,374	11,030

TABLE III

1983 BASIC TIMING ADJUSTMENTS

Degrees From Manufacturer's Setting	No. of Vehicles	
	+	-
1	2	4
2	16	8
3	4	4
4	6	2
5	2	0
6	1	2
7	0	1
8	0	0
9	1	0
10	0	0
11	0	0
	32	21

TOTAL 53

TABLE IV

OCTANE NUMBER REQUIREMENTS WITH 95% CONFIDENCE LIMITS

Weighted Population	Fuel	No. Vehicles	Research Octane No. 50% Sat.	Research Octane No. 90% Sat.	Motor Octane No. 50% Sat.	Motor Octane No. 90% Sat.
Maximum Octane Number Requirements						
• US and Imported Vehicles	PR	376	89.4 ± 0.31	93.6 ± 0.42	89.4 ± 0.31	93.6 ± 0.42
	FBRU	383	90.8 ± 0.39	96.0 ± 0.52	83.3 ± 0.24	86.7 ± 0.33
	FBRSU	376	91.5 ± 0.46	97.4 ± 0.63	81.6 ± 0.30	85.5 ± 0.41
• US and Imported Cars	PR	352	89.2 ± 0.34	93.8 ± 0.46	89.2 ± 0.34	93.8 ± 0.46
	FBRU	359	90.7 ± 0.43	96.3 ± 0.58	83.3 ± 0.27	86.9 ± 0.36
	FBRSU	352	91.4 ± 0.51	97.7 ± 0.69	81.6 ± 0.33	85.7 ± 0.45
• US Vehicles	PR	293	88.9 ± 0.34	92.7 ± 0.45	88.9 ± 0.34	92.7 ± 0.45
	FBRU	300	90.6 ± 0.42	95.8 ± 0.57	83.2 ± 0.27	86.5 ± 0.36
	FBRSU	293	91.3 ± 0.55	97.7 ± 0.74	81.5 ± 0.35	85.7 ± 0.48
• US Cars	PR	279	88.9 ± 0.37	92.7 ± 0.50	88.9 ± 0.37	92.7 ± 0.50
	FBRU	286	90.6 ± 0.46	96.1 ± 0.63	83.2 ± 0.29	86.8 ± 0.40
	FBRSU	279	91.2 ± 0.62	98.1 ± 0.83	81.4 ± 0.40	86.0 ± 0.54
• Imported Vehicles	PR	83	90.4 ± 1.01	96.3 ± 1.36	90.4 ± 1.01	96.3 ± 1.36
	FBRU	83	91.3 ± 0.89	96.5 ± 1.21	83.7 ± 0.57	87.0 ± 0.77
	FBRSU	83	92.1 ± 0.86	96.8 ± 1.16	82.0 ± 0.56	85.0 ± 0.76

TABLE V

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

1983 US and Imported Vehicles

Percent Satisfied	PR Fuels	FBRU Fuels			FBRSU Fuels		
		RON	MON	(R+M)/2	RON	MON	(R+M)/2
10	85.0	86.5	80.6	83.5	87.0	78.5	82.8
20	86.7	87.9	81.6	84.8	88.7	79.8	84.2
30	87.7	89.1	82.3	85.7	89.7	80.5	85.1
40	88.5	90.1	82.8	86.4	90.7	81.1	85.9
50	89.4	90.8	83.3	87.1	91.5	81.6	86.5
60	90.2	91.5	83.8	87.7	92.3	82.1	87.2
70	91.1	92.4	84.4	88.4	93.3	82.7	88.0
80	92.0	93.9	85.3	89.6	95.0	83.8	89.4
90	93.6	96.0	86.7	91.4	97.4	85.5	91.4
95	95.5	97.8	87.9	92.8	99.5	86.9	93.2
98	96.8	H	H	H	H	H	H
99	97.8	H	H	H	H	H	H

TABLE VI

COMPARISON OF MAXIMUM RESEARCH OCTANE NUMBER REQUIREMENTS

1983 and 1982 US and Imported Vehicles

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	85.0	84.4	0.6	86.5	85.1	1.4	87.0	86.9	0.1
20	86.7	86.0	0.7	87.9	86.8	1.1	88.7	88.6	0.1
30	87.7	87.0	0.7	89.1	87.9	1.2	89.7	89.5	0.2
40	88.5	88.0	0.5	90.1	88.8	1.3	90.7	90.3	0.4
50	89.4	88.8	0.6	90.8	89.6	1.2	91.5	91.2	0.3
60	90.2	89.5	0.7	91.5	90.6	0.9	92.3	92.2	0.1
70	91.1	90.4	0.7	92.4	91.7	0.7	93.3	93.2	0.1
80	92.0	91.6	0.4	93.9	93.1	0.8	95.0	94.5	0.5
90	93.6	93.1	0.5	96.0	94.9	1.1	97.4	96.5	0.9
95	95.5	94.3	1.2	97.8	96.9	0.9	99.5	98.8	0.7
98	96.8	H	-	H	99.5	-	H	H	-
99	97.8	H	-	H	H	-	H	H	-

TABLE VII

COMPARISON OF MAXIMUM MOTOR OCTANE NUMBER REQUIREMENTS

1983 and 1982 US and Imported Vehicles

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	85.0	84.4	0.6	80.6	80.0	0.6	78.5	78.3	0.2
20	86.7	86.0	0.7	81.6	81.0	0.6	79.8	79.6	0.2
30	87.7	87.0	0.7	82.3	81.6	0.7	80.5	80.4	0.1
40	88.5	88.0	0.5	82.8	82.1	0.7	81.1	81.0	0.1
50	89.4	88.8	0.6	83.3	82.6	0.7	81.6	81.5	0.1
60	90.2	89.5	0.7	83.8	83.1	0.7	82.1	82.2	-0.1
70	91.1	90.4	0.7	84.4	83.6	0.8	82.7	82.8	-0.1
80	92.0	91.6	0.4	85.3	84.2	1.1	83.8	83.6	0.2
90	93.6	93.1	0.5	86.7	85.6	1.1	85.5	85.0	0.5
95	95.5	94.3	1.2	87.9	87.0	0.9	86.9	86.6	0.3
98	96.8	H	-	H	88.9	-	H	H	-
99	97.8	H	-	H	H	-	H	H	-

TABLE VIII

COMPARISON OF MAXIMUM (R+M)/2 OCTANE NUMBER REQUIREMENTS

1983 and 1982 US and Imported Vehicles

Percent Satisfied	PR Fuels 1983	PR Fuels 1982	PR Fuels Δ	FBRU Fuels 1983	FBRU Fuels 1982	FBRU Fuels Δ	FBRSU Fuels 1983	FBRSU Fuels 1982	FBRSU Fuels Δ
10	85.0	84.4	0.6	83.5	82.5	1.0	82.8	82.6	0.2
20	86.7	86.0	0.7	84.8	83.9	0.9	84.2	84.1	0.1
30	87.7	87.0	0.7	85.7	84.8	0.9	85.1	84.9	0.2
40	88.5	88.0	0.5	86.4	85.4	1.0	85.9	85.6	0.3
50	89.4	88.8	0.6	87.1	86.1	1.0	86.5	86.3	0.2
60	90.2	89.5	0.7	87.7	86.8	0.9	87.2	87.2	0.0
70	91.1	90.4	0.7	88.4	87.8	0.6	88.0	88.0	0.0
80	92.0	91.6	0.4	89.6	88.7	0.9	89.4	89.0	0.4
90	93.6	93.1	0.5	91.4	90.3	1.1	91.4	90.8	0.6
95	95.5	94.3	1.2	92.8	92.0	0.8	93.2	92.7	0.5
98	96.8	H	-	H	94.2	-	H	H	-
99	97.8	H	-	H	H	-	H	H	-

TABLE IX

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

1983 US and Imported Cars

Percent Satisfied	PR Fuels	FBRU Fuels RON	FBRU Fuels MON	FBRU Fuels (R+M)/2	FBRSU Fuels RON	FBRSU Fuels MON	FBRSU Fuels (R+M)/2
10	84.7	86.3	80.5	83.4	86.8	78.3	82.5
20	86.5	87.9	81.5	84.7	88.7	79.8	84.2
30	87.5	89.1	82.3	85.7	89.7	80.5	85.1
40	88.4	90.1	82.8	86.4	90.6	81.1	85.9
50	89.3	90.7	83.3	87.0	91.4	81.6	86.5
60	90.0	91.5	83.8	87.7	92.3	82.1	87.2
70	91.0	92.5	84.4	88.5	93.4	82.8	88.1
80	92.0	94.0	85.4	89.7	95.4	84.1	89.8
90	93.8	96.3	86.9	91.6	97.7	85.7	91.7
95	95.7	98.2	88.1	93.2	100.1	87.4	93.7
98	97.0	H	H	H	H	H	H
99	98.0	H	H	H	H	H	H

TABLE X

COMPARISON OF MAXIMUM RESEARCH OCTANE NUMBER REQUIREMENTS

1983 and 1982 US and Imported Cars

Percent Satisfied	PR Fuels 1983	PR Fuels 1982	PR Fuels Δ	FBRU Fuels 1983	FBRU Fuels 1982	FBRU Fuels Δ	FBRSU Fuels 1983	FBRSU Fuels 1982	FBRSU Fuels Δ
10	84.7	84.4	0.3	86.3	85.1	1.2	86.8	86.8	0.0
20	86.5	85.9	0.6	87.9	86.7	1.2	88.7	88.5	0.2
30	87.5	87.1	0.4	89.1	87.9	1.2	89.7	89.5	0.2
40	88.4	88.0	0.4	90.1	88.9	1.2	90.6	90.3	0.3
50	89.3	88.7	0.6	90.7	89.7	1.0	91.4	91.2	0.2
60	90.0	89.4	0.6	91.5	90.6	0.9	92.3	92.2	0.1
70	91.0	90.2	0.8	92.5	91.7	0.8	93.4	93.2	0.2
80	92.0	91.4	0.6	94.0	93.0	1.0	95.4	94.4	1.0
90	93.8	92.9	0.9	96.3	94.8	1.5	97.7	96.7	1.0
95	95.7	94.0	1.7	98.2	97.3	0.9	100.1	99.1	1.0
98	97.0	96.7	0.3	H	H	-	H	H	-
99	98.0	H	-	H	H	-	H	H	-

TABLE XI

COMPARISON OF MAXIMUM MOTOR OCTANE NUMBER REQUIREMENTS

1983 and 1982 US and Imported Cars

Percent Satisfied	PR Fuels 1983	PR Fuels 1982	PR Fuels Δ	FBRU Fuels 1983	FBRU Fuels 1982	FBRU Fuels Δ	FBRSU Fuels 1983	FBRSU Fuels 1982	FBRSU Fuels Δ
10	84.7	84.4	0.3	80.5	80.0	0.5	78.3	78.3	0.0
20	86.5	85.9	0.4	81.5	80.9	0.6	79.8	79.5	0.3
30	87.5	87.1	0.4	82.3	81.7	0.6	80.5	80.3	0.2
40	88.4	88.0	0.4	82.8	82.1	0.7	81.1	81.0	0.1
50	89.3	88.7	0.6	83.3	82.6	0.7	81.6	81.5	0.1
60	90.0	89.4	0.6	83.8	83.1	0.7	82.1	82.2	-0.1
70	91.0	90.2	0.8	84.4	83.6	0.8	82.8	82.8	0.0
80	92.0	91.4	0.6	85.4	84.2	1.2	84.1	83.6	0.5
90	93.8	92.9	0.9	86.9	85.6	1.3	85.7	85.1	0.6
95	95.7	94.0	1.7	88.1	87.3	0.8	87.4	86.9	0.5
98	97.0	96.7	0.3	H	H	-	H	H	-
99	98.0	H	-	H	H	-	H	H	-

TABLE XII

COMPARISON OF MAXIMUM (R+M)/2 OCTANE NUMBER REQUIREMENTS

1983 and 1982 US and Imported Cars

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	84.7	84.4	0.3	83.4	82.5	0.9	82.5	82.6	-0.1
20	86.5	85.9	0.6	84.7	83.8	0.9	84.2	84.0	0.2
30	87.5	87.1	0.4	85.7	84.8	0.9	85.1	84.9	0.2
40	88.4	88.0	0.4	86.4	85.5	0.9	85.9	85.6	0.3
50	89.3	88.7	0.6	87.0	86.2	0.8	86.5	86.4	0.1
60	90.0	89.4	0.6	87.7	86.8	0.9	87.2	87.2	0.0
70	91.0	90.2	0.8	88.5	87.6	0.9	88.1	88.0	0.1
80	92.0	91.4	0.6	89.7	88.6	1.1	89.8	89.0	0.8
90	93.8	92.9	0.9	91.6	90.2	1.4	91.7	90.9	0.8
95	95.7	94.0	1.7	93.2	92.3	0.9	93.7	93.0	0.7
98	97.0	96.7	0.3	H	H	-	H	H	-
99	98.0	H	-	H	H	-	H	H	-

TABLE XIII

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

1983 US Vehicles

Percent Satisfied	PR Fuels	FBRU Fuels RON	FBRU Fuels MON	FBRU Fuels (R+M)/2	FBRSU Fuels RON	FBRSU Fuels MON	FBRSU Fuels (R+M)/2
10	85.0	86.4	80.5	83.4	86.8	78.4	82.6
20	86.5	87.9	81.6	84.7	88.5	79.6	84.1
30	87.4	89.0	82.2	85.6	89.5	80.3	84.9
40	88.2	89.9	82.7	86.3	90.4	80.9	85.7
50	89.0	90.6	83.2	86.9	91.3	81.5	86.4
60	89.9	91.3	83.7	87.5	92.1	81.9	87.0
70	90.7	92.2	84.2	88.2	93.1	82.5	87.8
80	91.6	93.5	85.1	89.3	94.8	83.7	89.2
90	92.7	95.8	86.5	91.1	97.7	85.7	91.7
95	94.3	97.9	88.0	93.0	100.3	87.6	93.9
98	95.5	H	H	H	H	H	H
99	96.1	H	H	H	H	H	H

TABLE XIV

COMPARISON OF MAXIMUM RESEARCH OCTANE NUMBER REQUIREMENTS

1983 and 1982 US Vehicles

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	85.0	84.3	0.7	86.4	85.0	-0.6	86.8	86.7	0.1
20	86.5	85.9	0.6	87.9	86.6	1.3	88.5	88.6	-0.1
30	87.4	86.9	0.5	89.0	87.8	0.2	89.5	89.5	0.0
40	88.2	87.8	0.4	89.9	88.8	1.1	90.4	90.3	0.1
50	89.0	88.6	0.4	90.6	89.6	1.0	91.3	91.3	0.0
60	89.9	89.3	0.6	91.3	90.6	0.7	92.1	92.3	-0.2
70	90.7	90.0	0.7	92.2	91.7	0.5	93.1	93.3	-0.2
80	91.6	91.1	0.5	93.5	93.1	0.4	94.8	94.5	0.3
90	92.7	92.7	0.0	95.8	95.0	0.8	97.7	96.5	1.2
95	94.3	93.8	0.5	97.9	96.6	1.3	100.3	98.4	1.9
98	95.5	96.1	-0.6	H	98.1	-	H	99.9	-
99	96.1	H	-	H	98.7	-	H	H	-

TABLE XV

COMPARISON OF MAXIMUM MOTOR OCTANE NUMBER REQUIREMENTS

1983 and 1982 US Vehicles

Percent Satisfied	PR Fuels 1983	PR Fuels 1982	PR Fuels Δ	FBRU Fuels 1983	FBRU Fuels 1982	FBRU Fuels Δ	FBRSU Fuels 1983	FBRSU Fuels 1982	FBRSU Fuels Δ
10	85.0	84.3	0.7	80.5	79.9	0.6	78.4	78.2	0.2
20	86.5	85.9	0.6	81.6	80.9	0.7	79.6	79.6	0.0
30	87.4	86.9	0.5	82.2	81.6	0.6	80.3	80.4	-0.1
40	88.2	87.8	0.4	82.7	82.1	0.6	80.9	81.0	-0.1
50	89.0	88.6	0.4	83.2	82.6	0.6	81.5	81.6	-0.1
60	89.9	89.3	0.6	83.7	83.1	0.6	81.9	82.3	-0.4
70	90.7	90.0	0.7	84.2	83.6	0.6	82.5	82.9	-0.4
80	91.6	91.1	0.5	85.1	84.3	0.8	83.7	83.6	0.1
90	92.7	92.7	0.0	86.5	85.7	0.8	85.7	84.9	0.8
95	94.3	93.8	0.5	88.0	86.8	1.2	87.6	86.4	1.2
98	95.5	96.1	-0.6	H	87.9	-	H	87.6	-
99	96.1	H	-	H	88.3	-	H	H	-

TABLE XVI

COMPARISON OF MAXIMUM (R+M)/2 OCTANE NUMBER REQUIREMENTS

1983 and 1982 US Vehicles

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	85.0	84.3	0.7	83.4	82.5	0.9	82.6	82.4	0.2
20	86.5	85.6	0.9	84.7	83.8	0.9	84.1	84.0	0.1
30	87.4	86.9	0.5	85.6	84.7	0.9	84.9	84.9	0.0
40	88.2	87.8	0.4	86.3	85.4	0.9	85.7	85.6	0.1
50	89.0	88.6	0.4	86.9	86.1	0.8	86.4	86.4	0.0
60	89.9	89.3	0.6	87.5	86.8	0.7	87.0	87.3	-0.3
70	90.7	90.0	0.7	88.2	87.6	0.6	87.8	88.1	-0.3
80	91.6	91.1	0.5	89.3	88.7	0.6	89.2	89.0	0.2
90	92.7	92.7	0.0	91.1	90.3	0.8	91.7	90.7	1.0
95	94.3	93.8	0.5	93.0	91.7	1.3	93.9	92.4	1.5
98	95.5	96.1	[illegible]	H	93.0	-	H	93.7	-
99	96.1	H	-	H	93.5	-	H	H	-

TABLE XVII

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

1983 US Cars

Percent Satisfied	PR Fuels	FBRU Fuels			FBRSU Fuels		
		RON	MON	(R+M)/2	RON	MON	(R+M)/2
10	84.7	86.1	80.4	83.3	86.5	78.2	82.4
20	86.3	87.9	81.6	84.7	88.5	79.6	84.0
30	87.2	89.1	82.2	85.7	89.6	80.4	85.0
40	88.1	90.0	82.8	86.4	90.4	81.0	85.7
50	88.9	90.6	83.2	86.9	91.2	81.4	86.3
60	89.7	91.3	83.7	87.5	92.0	81.9	87.0
70	90.5	92.3	84.3	88.3	93.3	82.7	88.0
80	91.5	93.8	85.3	89.6	95.3	84.0	89.6
90	92.7	96.1	86.8	91.4	98.1	86.0	92.0
95	94.3	98.6	88.4	93.5	100.8	88.0	94.4
98	95.6	H	H	H	H	H	H
99	96.2	H	H	H	H	H	H

TABLE XVIII

COMPARISON OF MAXIMUM RESEARCH OCTANE NUMBER REQUIREMENTS

1983 and 1982 US Cars

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	84.7	84.4	0.3	86.1	85.0	1.1	86.5	86.7	-0.2
20	86.3	85.9	0.4	87.9	86.6	1.3	88.5	88.4	0.1
30	87.2	87.1	0.1	89.1	87.9	1.2	89.6	89.4	0.2
40	88.1	87.9	0.2	90.0	88.9	1.1	90.4	90.3	0.1
50	88.9	88.6	0.3	90.6	89.7	0.9	91.2	91.3	-0.1
60	89.7	89.2	0.5	91.3	90.6	0.7	92.0	92.3	-0.3
70	90.5	90.0	0.5	92.3	91.7	0.6	93.3	93.2	0.1
80	91.5	90.9	0.6	93.8	93.0	0.8	95.3	94.5	0.8
90	92.7	92.4	0.3	96.1	94.8	1.3	98.1	96.6	1.5
95	94.3	93.4	0.9	98.6	96.8	1.8	100.8	98.7	2.1
98	95.6	94.3	1.3	H	98.3	-	H	H	-
99	96.2	95.0	1.2	H	98.9	-	H	H	-

TABLE XIX

COMPARISON OF MAXIMUM MOTOR OCTANE NUMBER REQUIREMENTS

1983 and 1982 US Cars

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	84.7	84.4	0.3	80.4	79.9	0.5	78.2	78.2	0.0
20	86.3	85.9	0.4	81.6	80.9	0.7	79.6	79.5	0.1
30	87.2	87.1	0.1	82.2	81.6	0.6	80.4	80.3	0.1
40	88.1	87.9	0.2	82.8	82.2	0.6	81.0	81.0	0.0
50	88.9	88.6	0.3	83.2	82.6	0.6	81.4	81.6	-0.2
60	89.7	89.2	0.5	83.7	83.1	0.6	81.9	82.3	-0.4
70	90.5	90.0	0.5	84.3	83.6	0.7	82.7	82.8	-0.1
80	91.5	90.9	0.6	85.3	84.2	1.1	84.0	83.6	0.4
90	92.7	92.4	0.3	86.8	85.5	1.3	86.0	85.0	1.0
95	94.3	93.4	0.9	88.4	87.0	1.4	88.0	86.6	1.4
98	95.6	94.3	1.3	H	88.0	-	H	H	-
99	96.2	95.0	1.2	H	88.4	-	H	H	-

TABLE XX

COMPARISON OF MAXIMUM (R+M)/2 OCTANE NUMBER REQUIREMENTS

1983 and 1982 US Cars

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	84.7	84.4	0.3	83.3	82.5	0.8	82.4	82.4	0.0
20	86.3	85.9	0.4	84.7	83.7	1.0	84.0	84.0	0.0
30	87.2	87.1	0.1	85.7	84.7	1.0	85.0	84.9	0.1
40	88.1	87.9	0.2	86.4	85.5	0.9	85.7	85.7	0.0
50	88.9	88.6	0.3	86.4	86.2	0.7	86.3	86.5	-0.2
60	89.7	89.2	0.5	87.5	86.8	0.7	87.0	87.3	-0.3
70	90.5	90.0	0.5	88.3	87.6	0.7	88.0	88.0	0.0
80	91.5	90.9	0.6	89.6	88.6	1.0	89.6	89.0	0.6
90	92.7	92.4	0.3	91.4	90.2	1.2	92.0	90.8	1.2
95	94.3	93.4	0.9	93.5	91.9	1.6	94.4	92.6	1.8
98	95.6	94.3	1.3	H	93.1	-	H	H	-
99	96.2	95.0	1.2	H	93.6	-	H	H	-

TABLE XXI

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

1983 Imported Vehicles

Percent Satisfied	PR Fuels	FBRU Fuels			FBRSU Fuels		
		RON	MON	(R+M)/2	RON	MON	(R+M)/2
10	84.9	86.7	80.7	83.7	87.9	79.2	83.6
20	87.6	88.0	81.6	84.8	89.4	80.3	84.9
30	88.8	89.5	82.5	86.0	90.5	81.0	85.7
40	89.7	90.5	83.2	86.8	91.3	81.5	86.4
50	90.4	91.3	83.7	87.5	92.1	82.0	87.1
60	91.3	92.0	84.1	88.1	92.8	82.4	87.6
70	92.2	93.1	84.8	88.9	94.0	83.1	88.6
80	93.8	94.7	85.8	90.3	95.5	84.2	89.8
90	96.3	96.5	87.0	91.7	96.8	85.0	90.9
95	97.5	97.6	87.7	92.6	97.8	85.8	91.8
98	H	H	H	H	H	H	H
99	H	H	H	H	H	H	H

TABLE XXII

COMPARISON OF MAXIMUM RESEARCH OCTANE NUMBER REQUIREMENTS

1983 and 1982 Imported Vehicles

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	84.9	84.7	0.2	86.7	85.4	1.3	87.9	87.5	0.4
20	87.6	86.2	1.4	88.0	87.2	0.8	89.4	88.8	0.6
30	88.8	87.4	1.4	89.5	88.1	1.4	90.5	89.6	0.9
40	89.7	88.5	1.2	90.5	88.9	1.6	91.3	90.2	1.1
50	90.4	89.4	1.0	91.3	89.7	1.6	92.1	90.9	1.2
60	91.3	90.3	1.0	92.0	90.6	1.4	92.8	91.8	1.0
70	92.2	91.3	0.9	93.1	91.6	1.5	94.0	92.9	1.1
80	93.8	92.5	1.3	94.7	92.9	1.8	95.5	94.4	1.1
90	96.3	94.1	2.2	96.5	94.7	1.8	96.8	96.8	0.0
95	97.5	H	-	97.6	H	-	97.8	H	-
98	H	H	-	H	H	-	H	H	-
99	H	H	-	H	H	-	H	H	-

TABLE XXIII

COMPARISON OF MAXIMUM MOTOR OCTANE NUMBER REQUIREMENTS

1983 and 1982 Imported Vehicles

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	84.9	84.7	0.2	80.7	80.1	0.6	79.2	78.8	0.4
20	87.6	86.2	1.4	81.6	81.2	0.4	80.3	79.7	0.6
30	88.8	87.4	1.4	82.5	81.8	0.7	81.0	80.4	0.6
40	89.7	88.5	1.2	83.2	82.2	1.0	81.5	80.9	0.6
50	90.4	89.4	1.0	83.7	82.6	1.1	82.0	81.3	0.7
60	91.3	90.3	1.0	84.1	83.1	1.0	82.4	82.0	0.4
70	92.2	91.3	0.9	84.8	83.5	1.3	83.1	82.6	0.5
80	93.8	92.5	1.3	85.8	84.1	1.7	84.2	83.5	0.7
90	96.3	94.1	2.2	87.0	85.5	1.5	85.0	85.2	-0.2
95	97.5	H	-	87.7	H	-	85.8	H	-
98	H	H	-	H	H	-	H	H	-
99	H	H	-	H	H	-	H	H	-

TABLE XXIV

COMPARISON OF MAXIMUM (R+M)/2 OCTANE NUMBER REQUIREMENTS

1983 and 1982 Imported Vehicles

Percent Satisfied	PR Fuels			FBRU Fuels			FBRSU Fuels		
	1983	1982	Δ	1983	1982	Δ	1983	1982	Δ
10	84.9	84.7	0.2	83.7	82.7	1.0	83.6	83.1	0.5
20	87.6	86.2	1.4	84.8	84.2	0.6	84.9	84.3	0.6
30	88.8	87.4	1.4	86.0	85.0	1.0	85.7	85.0	0.7
40	89.7	88.5	1.2	86.8	85.5	1.3	86.4	85.6	0.8
50	90.4	89.4	1.0	87.5	86.2	1.3	87.1	86.1	1.0
60	91.3	90.3	1.0	88.1	86.8	1.3	87.6	86.9	0.7
70	92.2	91.3	0.9	88.9	87.6	1.3	88.6	87.8	0.8
80	93.8	92.5	1.3	90.3	88.5	1.8	89.8	89.0	0.8
90	96.3	94.1	2.2	91.7	90.1	1.6	90.9	91.0	-0.1
95	97.5	H	-	92.6	H	-	91.8	H	-
98	H	H	-	H	H	-	H	H	-
99	H	H	-	H	H	-	H	H	-

TABLE XXV

MAXIMUM OCTANE NUMBER REQUIREMENTS

All 1983 US and Imported Vehicles

PR FUELS

% Satisfaction (Midpoint)	Knock Sensors (High) RON	Knock Sensors (Low) RON	No Knock Sensors RON
5.0	83.26	81.93	83.20
10.0	85.00	84.06	84.88
15.0	86.08	85.34	86.01
20.0	86.69	86.28	86.73
25.0	87.21	86.95	87.30
30.0	87.66	87.47	87.78
35.0	88.09	87.95	88.23
40.0	88.54	88.40	88.66
45.0	88.98	88.84	89.07
50.0	89.38	89.25	89.45
55.0	89.78	89.65	89.84
60.0	90.20	90.06	90.24
65.0	90.64	90.50	90.67
70.0	91.08	90.97	91.10
75.0	91.50	91.40	91.50
80.0	91.96	91.87	91.96
85.0	92.56	92.47	92.55
90.0	93.61	93.45	93.55
95.0	95.46	95.44	95.43
96.0	95.87	95.87	95.84
97.0	96.30	96.30	96.24
98.0	96.83	96.83	96.72
99.0	97.84	97.67	97.51
No. of Vehicles	383	381	367

TABLE XXVI

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

All 1983 US and Imported Vehicles

FBRU FUELS

% SATISFACTION (MIDPOINT)	Knock Sensors, High (383 Vehicles) RON	MON	(R+M)/2	Knock Sensors, Low (381 Vehicles) RON	MON	(R+M)/2	No Knock Sensors (367 Vehicles) RON	MON	(R+M)/2
5.0	84.81	79.47	82.14	82.96	78.17	80.57	84.75	79.42	82.08
10.0	86.45	80.57	83.51	85.66	80.07	82.86	86.44	80.57	83.50
15.0	87.30	81.11	84.21	86.88	80.83	83.86	87.41	81.19	84.30
20.0	87.94	81.56	84.75	87.63	81.34	84.48	88.09	81.65	84.87
25.0	88.56	81.93	85.24	88.26	81.75	85.01	88.67	82.00	85.34
30.0	89.11	82.27	85.69	88.84	82.11	85.47	89.19	82.32	85.76
35.0	89.60	82.56	86.08	89.37	82.42	85.89	89.67	82.60	86.14
40.0	90.05	82.83	86.44	89.86	82.71	86.29	90.10	82.87	86.48
45.0	90.41	83.09	86.75	90.26	82.98	86.62	90.45	83.12	86.79
50.0	90.77	83.34	87.05	90.62	83.24	86.93	90.80	83.36	87.08
55.0	91.13	83.58	87.36	90.99	83.49	87.24	91.15	83.59	87.37
60.0	91.51	83.80	87.66	91.36	83.72	87.54	91.51	83.81	87.66
65.0	91.90	84.04	87.97	91.75	83.95	87.85	91.89	84.03	87.96
70.0	92.43	84.36	88.39	92.22	84.23	88.23	92.41	84.34	88.38
75.0	93.06	84.74	88.90	92.86	84.62	88.74	93.03	84.72	88.87
80.0	93.85	85.29	89.57	93.64	85.15	89.40	93.80	85.26	89.53
85.0	94.77	85.86	90.32	94.55	85.73	90.14	94.67	85.80	90.24
90.0	96.03	86.72	91.38	95.79	86.55	91.17	95.93	86.65	91.29
95.0	97.80	87.86	92.83	97.58	87.70	92.64	97.74	87.82	92.78
96.0	98.40	88.32	93.36	98.17	88.14	93.16	98.34	88.27	93.31
97.0	99.40	89.08	94.24	98.96	88.77	93.86	99.27	88.99	94.13
98.0	—	—	—	100.98	90.29	95.63	—	—	—

TABLE XXVII

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

All 1983 US and Imported Vehicles

FBRSU FUELS

	Knock Sensors, High (383 Vehicles)			Knock Sensors, Low (381 Vehicles)			No Knock Sensors (367 Vehicles)		
% SATISFACTION (MIDPOINT)	RON	MON	(R+M)/2	RON	MON	(R+M)/2	RON	MON	(R+M)/2
5.0	85.47	77.43	81.45	84.01	76.41	80.21	85.41	77.39	81.40
10.0	87.02	78.52	82.77	86.28	78.00	82.14	86.95	78.46	82.70
15.0	88.03	79.32	83.67	87.52	78.91	83.21	88.12	79.38	83.75
20.0	88.67	79.77	84.22	88.34	79.54	83.94	88.79	79.85	84.32
25.0	89.22	80.15	84.69	88.93	79.95	84.44	89.32	80.22	84.77
30.0	89.70	80.49	85.10	89.44	80.31	84.87	89.77	80.54	85.16
35.0	90.17	80.80	85.49	89.91	80.64	85.27	90.23	80.84	85.53
40.0	90.65	81.09	85.87	90.40	80.94	85.67	90.69	81.12	85.91
45.0	91.09	81.35	86.22	90.89	81.23	86.06	91.12	81.37	86.25
50.0	91.48	81.59	86.53	91.31	81.49	86.40	91.50	81.60	86.55
55.0	91.86	81.82	86.84	91.71	81.72	86.72	91.87	81.82	86.85
60.0	92.28	82.07	87.18	92.12	81.97	87.05	92.28	82.07	87.17
65.0	92.74	82.34	87.54	92.57	82.24	87.41	92.71	82.33	87.52
70.0	93.31	82.69	88.00	93.06	82.54	87.80	93.24	82.64	87.94
75.0	94.06	83.14	88.60	93.82	82.99	88.40	93.96	83.08	88.52
80.0	95.00	83.80	89.40	94.74	83.62	89.18	94.86	83.70	89.28
85.0	96.23	84.66	90.44	96.00	84.50	90.25	96.12	84.59	90.36
90.0	97.40	85.48	91.44	97.12	85.29	91.20	97.31	85.41	91.36
95.0	99.45	86.91	93.18	99.22	86.75	92.98	99.50	86.95	93.23
98.0	100.39	87.61	94.00	100.20	87.46	93.83	100.44	87.65	94.05

TABLE XXVIII

MAXIMUM OCTANE NUMBER REQUIREMENTS

All 1983 US and Imported Cars

PR FUELS

% Satisfaction (Midpoint)	Knock Sensors (High) RON	Knock Sensors (Low) RON	No Knock Sensors RON
5.0	83.03	82.34	82.86
10.0	84.69	84.33	84.59
15.0	85.75	85.41	85.67
20.0	86.46	86.24	86.42
25.0	87.01	86.83	87.01
30.0	87.51	87.35	87.51
35.0	87.97	87.82	87.98
40.0	88.43	88.27	88.43
45.0	88.87	88.71	88.86
50.0	89.27	89.13	89.25
55.0	89.65	89.51	89.62
60.0	90.03	89.89	90.00
65.0	90.49	90.33	90.44
70.0	90.96	90.81	90.90
75.0	91.44	91.30	91.38
80.0	91.96	91.84	91.90
85.0	92.60	92.50	92.54
90.0	93.81	93.61	93.63
95.0	95.68	95.67	95.61
96.0	96.09	96.09	96.04
97.0	96.48	96.48	96.38
98.0	97.00	97.00	96.85
99.0	-	97.83	97.64
No. of Vehicles	359	357	346

TABLE XXIX

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

All 1983 US and Imported Cars

FBRU FUELS

% SATISFACTION (MIDPOINT)	Knock Sensors, High (359 Cars)			Knock Sensors, Low (357 Cars)			No Knock Sensors (346 Cars)		
	RON	MON	(R+M)/2	RON	MON	(R+M)/2	RON	MON	(R+M)/2
5.0	84.57	79.30	81.94	84.15	79.01	81.58	84.47	79.23	81.85
10.0	86.26	80.45	83.35	85.99	80.29	83.14	86.16	80.39	83.28
15.0	87.22	81.06	84.14	86.94	80.87	83.91	87.15	81.01	84.08
20.0	87.88	81.52	84.70	87.58	81.31	84.45	87.81	81.46	84.64
25.0	88.51	81.91	85.21	88.16	81.70	84.93	88.42	81.85	85.14
30.0	89.09	82.25	85.67	88.77	82.06	85.42	88.99	82.20	85.60
35.0	89.59	82.55	86.07	89.32	82.39	85.86	89.51	82.51	86.01
40.0	90.05	82.83	86.44	89.83	82.70	86.27	90.00	82.80	86.40
45.0	90.40	83.08	86.74	90.24	82.96	86.60	90.35	83.04	86.70
50.0	90.74	83.32	87.03	90.58	83.21	86.89	90.69	83.28	86.98
55.0	91.09	83.56	87.33	90.93	83.45	87.19	91.03	83.52	87.27
60.0	91.49	83.80	87.65	91.32	83.69	87.50	91.42	83.75	87.59
65.0	91.91	84.05	87.98	91.73	83.94	87.83	91.82	83.99	87.91
70.0	92.51	84.41	88.46	92.25	84.25	88.25	92.38	84.33	88.35
75.0	93.21	84.85	89.03	92.98	84.69	88.83	93.09	84.76	88.92
80.0	93.99	85.39	89.69	93.77	85.24	89.50	93.86	85.30	89.58
85.0	95.00	86.00	90.50	94.73	85.84	90.28	94.79	85.88	90.34
90.0	96.30	86.88	91.59	96.06	86.74	91.40	96.15	86.79	91.47
95.0	98.17	88.13	93.15	97.94	87.96	92.95	98.05	88.04	93.05
96.0	98.77	88.61	93.69	98.55	88.44	93.50	98.67	88.54	93.61
97.0	100.17	89.64	94.90	99.72	89.31	94.52	99.98	89.49	94.73

TABLE XXX

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

All 1983 US and Imported Cars

FBRSU FUELS

% SATISFACTION (MIDPOINT)	Knock Sensors, High (359 Cars)			Knock Sensors, Low (357 Cars)			No Knock Sensors (346 Cars)		
	RON	MON	(R+M)/2	RON	MON	(R+M)/2	RON	MON	(R+M)/2
5.0	85.26	77.28	81.27	84.91	77.04	80.97	85.16	77.21	81.19
10.0	86.75	78.32	82.54	86.56	78.19	82.37	86.67	78.27	82.47
15.0	87.88	79.20	83.54	87.58	78.96	83.27	87.79	79.14	83.46
20.0	88.65	79.76	84.20	88.33	79.53	83.93	88.57	79.70	84.14
25.0	89.25	80.17	84.71	88.92	79.95	84.43	89.17	80.12	84.65
30.0	89.73	80.51	85.12	89.43	80.30	84.87	89.65	80.45	85.05
35.0	90.19	80.81	85.50	89.90	80.63	85.27	90.10	80.76	85.43
40.0	90.62	81.07	85.85	90.37	80.92	85.64	90.54	81.02	85.78
45.0	91.04	81.33	86.18	90.82	81.19	86.00	90.96	81.28	86.12
50.0	91.44	81.56	86.50	91.24	81.45	86.34	91.36	81.52	86.44
55.0	91.84	81.80	86.82	91.65	81.69	86.67	91.76	81.75	86.76
60.0	92.29	82.07	87.18	92.09	81.95	87.02	92.18	82.01	87.10
65.0	92.79	82.37	87.58	92.58	82.25	87.42	92.67	82.30	87.48
70.0	93.44	82.76	88.10	93.15	82.59	87.87	93.24	82.64	87.94
75.0	94.28	83.30	88.79	93.93	83.06	88.50	94.00	83.10	88.55
80.0	95.42	84.10	89.76	95.08	83.86	89.[illegible]7	95.13	83.89	89.51
85.0	96.49	84.84	90.66	96.24	84.67	90.45	96.32	84.72	90.52
90.0	97.66	85.66	91.66	97.37	85.46	91.41	97.50	85.55	91.53
95.0	100.08	87.37	93.73	99.85	87.20	93.52	100.04	87.34	93.69
96.0	100.88	88.01	94.45	100.74	87.89	94.31	100.90	88.02	94.46

TABLE XXX1

MAXIMUM OCTANE NUMBER REQUIREMENTS

All 1983 US Vehicles

PR FUELS

% Satisfaction (Midpoint)	Knock Sensors (High) RON	Knock Sensors (Low) RON	No Knock Sensors RON
5.0	83.31	81.83	83.24
10.0	85.01	83.79	84.88
15.0	85.91	85.07	85.81
20.0	86.48	85.95	86.48
25.0	86.95	86.57	87.03
30.0	87.40	87.12	87.52
35.0	87.81	87.60	87.97
40.0	88.22	88.06	88.37
45.0	88.63	88.47	88.75
50.0	89.04	88.86	89.14
55.0	89.14	89.27	89.53
60.0	89.85	89.68	89.93
65.0	90.28	90.10	90.34
70.0	90.73	90.56	90.77
75.0	91.17	91.03	91.18
80.0	91.58	91.45	91.59
85.0	92.07	91.94	92.07
90.0	92.70	92.58	92.70
95.0	94.25	94.04	94.20
96.0	94.64	94.49	94.64
97.0	95.08	95.03	95.12
98.0	95.52	95.49	95.58
99.0	96.09	96.09	96.12
No. of Vehicles	300	298	285

TABLE XXXII

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

All 1983 US Vehicles

FBRU FUELS

% SATISFACTION (MIDPOINT)	Knock Sensors, High (300 Vehicles)			Knock Sensors, Low (298 Vehicles)			No Knock Sensors (285 Vehicles)		
	RON	MON	(R+M)/2	RON	MON	(R+M)/2	RON	MON	(R+M)/2
5.0	84.84	79.49	82.17	82.99	78.14	80.57	84.79	79.45	82.12
10.0	86.36	80.52	83.44	85.28	79.79	82.54	86.34	80.50	83.42
15.0	87.26	81.08	84.17	86.63	80.68	83.65	87.43	81.20	84.31
20.0	87.93	81.55	84.74	87.49	81.24	84.37	88.14	81.68	84.91
25.0	88.51	81.91	85.21	88.14	81.69	84.91	88.67	82.00	85.34
30.0	89.04	82.22	85.63	88.70	82.02	85.36	89.15	82.29	85.72
35.0	89.48	82.49	85.99	89.20	82.32	85.76	89.58	82.55	86.07
40.0	89.91	82.74	86.32	89.66	82.59	86.13	89.99	82.80	86.40
45.0	90.27	82.99	86.63	90.08	82.85	86.47	90.33	83.03	86.68
50.0	90.61	83.23	86.92	90.43	83.10	86.76	90.67	83.27	86.97
55.0	90.96	83.47	87.22	90.78	83.34	87.06	91.00	83.50	87.25
60.0	91.33	83.70	87.52	91.14	83.58	87.36	91.36	83.71	87.54
65.0	91.72	83.93	87.83	91.52	83.81	87.67	91.73	83.94	87.83
70.0	92.19	84.22	88.21	91.93	84.06	87.99	92.18	84.21	88.20
75.0	92.83	84.60	88.71	92.56	84.43	88.50	92.82	84.59	88.71
80.0	93.54	85.08	89.31	93.29	84.90	89.09	93.52	85.06	89.29
85.0	94.44	85.66	90.05	94.14	85.48	89.81	94.37	85.62	90.00
90.0	95.76	86.53	91.14	95.40	86.28	90.84	95.67	86.47	91.07
95.0	97.94	87.96	92.95	97.74	87.82	92.78	97.99	87.99	92.99
96.0	98.83	88.66	93.74	98.54	88.43	93.48	98.82	88.65	93.74
97.0	100.25	89.70	94.97	99.86	89.40	94.63	100.19	89.68	94.92

TABLE XXXIII

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

All 1983 US Vehicles

FBRSU FUELS

% SATISFACTION (MIDPOINT)	Knock Sensors, High (300 Vehicles) RON	MON	(R+M)/2	Knock Sensors, Low (298 Vehicles) RON	MON	(R+M)/2	No Knock Sensors (285 Vehicles) RON	MON	(R+M)/2
5.0	85.46	77.42	81.44	83.46	76.02	79.74	85.41	77.39	81.40
10.0	86.79	78.35	82.57	85.88	77.72	81.80	86.70	78.29	82.50
15.0	87.79	79.13	83.46	87.08	78.57	82.82	87.89	79.21	83.55
20.0	88.47	79.63	84.05	88.04	79.33	83.68	88.60	79.72	84.16
25.0	89.01	80.01	84.51	88.63	79.74	84.18	89.15	80.11	84.63
30.0	89.49	80.34	84.92	89.15	80.10	84.63	89.59	80.41	85.00
35.0	89.93	80.65	85.29	89.61	80.43	85.02	90.00	80.70	85.35
40.0	90.41	80.94	85.68	90.06	80.74	85.40	90.48	80.99	85.73
45.0	90.88	81.23	86.05	90.57	81.04	85.80	90.94	81.26	86.10
50.0	91.28	81.47	86.37	91.05	81.33	86.19	91.31	81.49	86.40
55.0	91.65	81.69	86.67	91.44	81.57	86.50	91.68	81.71	86.69
60.0	92.05	81.93	86.99	91.84	81.80	86.82	92.06	81.94	87.00
65.0	92.54	82.22	87.38	92.30	82.08	87.19	92.52	82.21	87.37
70.0	93.07	82.54	87.81	92.81	82.39	87.60	93.01	82.51	87.76
75.0	93.80	82.98	88.39	93.48	82.79	88.14	93.72	82.93	88.32
80.0	94.78	83.65	89.21	94.39	83.37	88.88	94.64	83.55	89.09
85.0	96.21	84.65	90.43	95.73	84.31	90.02	96.04	84.53	90.29
90.0	97.73	85.71	91.72	97.37	85.46	91.42	97.64	85.65	91.65
95.0	100.32	87.55	93.93	100.13	87.40	93.77	100.41	87.62	94.01
96.0	—	—	—	100.92	88.04	94.48	—	—	—

TABLE XXXIV

MAXIMUM OCTANE NUMBER REQUIREMENTS

All 1983 US Cars

PR FUELS

% Satisfaction (Midpoint)	Knock Sensors (High) RON	Knock Sensors (Low) RON	No Knock Sensors RON
5.0	83.06	82.33	82.90
10.0	84.70	84.26	84.58
15.0	85.60	85.22	85.50
20.0	86.24	85.97	86.18
25.0	86.74	86.50	86.70
30.0	87.21	86.98	87.19
35.0	87.67	87.47	87.67
40.0	88.11	87.93	88.11
45.0	88.52	88.34	88.51
50.0	88.93	88.73	88.90
55.0	89.30	89.12	89.27
60.0	89.67	89.49	89.63
65.0	90.07	89.87	90.02
70.0	90.54	90.32	90.47
75.0	91.04	90.83	90.97
80.0	91.52	91.34	91.45
85.0	92.08	91.92	92.01
90.0	92.73	92.59	92.67
95.0	94.25	94.00	94.11
96.0	94.66	94.48	94.59
97.0	95.12	95.05	95.12
98.0	95.62	95.59	95.66
99.0	96.15	96.15	96.17
No. of Vehicles	283	281	271

TABLE XXXV

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

All 1983 US Cars

FBRU FUELS

% SATISFACTION (MIDPOINT)	Knock Sensors, High (283 Cars)			Knock Sensors, Low (281 Cars)			No Knock Sensors (271 Cars)		
	RON	MON	(R+M)/2	RON	MON	(R+M)/2	RON	MON	(R+M)/2
5.0	84.66	79.36	82.01	84.23	79.06	81.64	84.56	79.29	81.93
10.0	86.13	80.38	83.25	85.76	80.13	82.95	85.98	80.28	83.13
15.0	87.22	81.06	84.14	86.81	80.79	83.80	87.12	80.99	84.06
20.0	87.93	81.55	84.74	87.51	81.26	84.39	87.82	81.48	84.65
25.0	88.53	81.92	85.23	88.09	81.65	84.87	88.42	81.85	85.14
30.0	89.07	82.24	85.66	88.67	82.00	85.34	88.96	82.18	85.57
35.0	89.52	82.51	86.02	89.19	82.32	85.76	89.43	82.46	85.95
40.0	89.95	82.77	86.36	89.66	82.60	86.13	89.88	82.73	86.30
45.0	90.29	83.01	86.65	90.09	82.86	86.47	90.24	82.96	86.60
50.0	90.62	83.23	86.93	90.42	83.09	86.76	90.56	83.19	86.87
55.0	90.95	83.46	87.20	90.75	83.32	87.04	90.88	83.42	87.15
60.0	91.34	83.71	87.52	91.10	83.56	87.33	91.25	83.65	87.45
65.0	91.77	83.96	87.86	91.52	83.81	87.67	91.67	83.90	87.78
70.0	92.34	84.31	88.32	91.96	84.08	88.02	92.17	84.20	88.19
75.0	93.09	84.76	88.93	92.75	84.55	88.65	92.97	84.68	88.82
80.0	93.82	85.27	89.55	93.53	85.07	89.30	93.70	85.19	89.44
85.0	94.73	85.84	90.28	94.40	85.64	90.02	94.55	85.73	90.14
90.0	96.11	86.76	91.43	95.74	86.52	91.13	95.93	86.65	91.29
95.0	98.55	88.44	93.50	98.28	88.22	93.25	98.47	88.38	93.42
96.0	99.64	89.24	94.44	99.14	88.90	94.02	99.42	89.09	94.25
97.0	100.77	90.12	95.45	100.49	89.89	95.19	100.69	90.05	95.37

TABLE XXXVI

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

All 1983 US Cars

FBRSU FUELS

% SATISFACTION (MIDPOINT)	Knock Sensors, High (283 Cars)			Knock Sensors, Low (281 Cars)			No Knock Sensors (271 Cars)		
	RON	MON	(R+M)/2	RON	MON	(R+M)/2	RON	MON	(R+M)/2
5.0	85.29	77.30	81.29	84.88	77.02	80.95	85.20	77.24	81.22
10.0	86.53	78.17	82.35	86.30	78.01	82.16	86.44	78.10	82.27
15.0	87.57	78.96	83.27	87.26	78.71	82.98	87.45	78.86	83.16
20.0	88.45	79.61	84.03	88.06	79.34	83.70	88.35	79.54	83.94
25.0	89.09	80.06	84.58	88.65	79.76	84.21	88.99	79.99	84.49
30.0	89.56	80.39	84.98	89.17	80.12	84.65	89.48	80.32	84.89
35.0	90.00	80.70	85.35	89.63	80.44	85.04	89.88	80.62	85.25
40.0	90.42	80.95	85.69	90.07	80.74	85.41	90.31	80.89	85.60
45.0	90.84	81.20	86.02	90.52	81.01	85.77	90.73	81.14	85.93
50.0	91.23	81.44	86.34	90.96	81.28	86.12	91.13	81.38	86.26
55.0	91.63	81.68	86.65	91.37	81.52	86.45	91.53	81.62	86.57
60.0	92.04	81.92	86.98	91.79	81.77	86.78	91.93	81.80	86.89
65.0	92.64	82.28	87.46	92.31	82.08	87.20	92.47	82.18	87.33
70.0	93.32	82.69	88.00	92.93	82.46	87.70	93.09	82.55	87.82
75.0	94.14	83.20	88.67	93.73	82.94	88.33	93.87	83.02	88.44
80.0	95.25	83.98	89.62	94.77	83.64	89.20	94.90	83.73	89.32
85.0	96.62	84.93	90.78	96.16	84.61	90.38	96.32	84.72	90.52
90.0	98.09	85.96	92.03	97.70	85.69	91.70	97.90	85.83	91.88
95.0	100.83	87.96	94.40	100.68	87.84	94.26	100.86	87.99	94.42

TABLE XXXVII

MAXIMUM OCTANE NUMBER REQUIREMENTS

All 1983 Imported Vehicles

PR FUELS

% Satisfaction (Midpoint)	Knock Sensors (High) RON	No Knock Sensors RON
5.0	83.13	83.11
10.0	84.94	84.91
15.0	87.07	87.05
20.0	87.64	87.62
25.0	88.19	88.15
30.0	88.82	88.78
35.0	89.27	89.24
40.0	89.65	89.61
45.0	90.01	89.97
50.0	90.42	90.37
55.0	90.84	90.79
60.0	91.27	91.21
65.0	91.73	91.65
70.0	92.24	92.14
75.0	92.85	92.74
80.0	93.75	93.55
85.0	95.21	95.01
90.0	96.30	96.08
95.0	97.54	97.21
96.0	97.88	97.48
97.0	-	97.81
No. of Vehicles	83	82

TABLE XXXVIII

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

All 1983 Imported Vehicles

FBRU FUELS

% SATISFACTION (MIDPOINT)	Knock Sensors, High (83 Vehicles) RON	MON	(R+M)/2	No Knock Sensors (82 Vehicles) RON	MON	(R+M)/2
5.0	84.02	78.91	81.47	83.99	78.89	81.44
10.0	86.67	80.70	83.69	86.65	80.69	83.67
15.0	87.40	81.18	84.29	87.37	81.16	84.27
20.0	87.96	81.57	84.77	87.94	81.56	84.75
25.0	88.73	82.04	85.38	88.69	82.01	85.35
30.0	89.46	82.48	85.97	89.41	82.45	85.93
35.0	90.10	82.87	86.49	90.07	82.85	86.46
40.0	90.52	83.17	86.84	90.49	83.14	86.81
45.0	90.93	83.45	87.19	90.89	83.42	87.16
50.0	91.30	83.68	87.49	91.26	83.65	87.45
55.0	91.66	83.89	87.78	9´.61	83.87	87.74
60.0	92.03	84.12	88.08	91.97	84.08	88.03
65.0	92.53	84.42	88.47	92.45	84.37	88.41
70.0	93.09	84.76	88.93	92.96	84.68	88.82
75.0	94.04	85.42	89.73	93.88	85.32	89.60
80.0	94.71	85.82	90.27	94.57	85.74	90.16
85.0	95.55	86.38	90.97	95.36	86.25	90.80
90.0	96.45	86.97	91.71	96.26	86.85	91.56
95.0	97.56	87.69	92.62	97.30	87.51	92.41
98.0	97.88	87.91	92.80	97.64	87.75	92.69

TABLE XXXIX

MAXIMUM RESEARCH, MOTOR, AND (R+M)/2 OCTANE NUMBER REQUIREMENTS

All 1983 Imported Vehicles

FBRSU FUELS

% SATISFACTION (MIDPOINT)	Knock Sensors, High (83 Vehicles) RON	MON	(R+M)/2	No Knock Sensors (82 Vehicles) RON	MON	(R+M)/2
5.0	85.39	77.37	81.38	85.32	77.32	81.32
10.0	87.91	79.23	83.57	87.89	79.21	83.55
15.0	88.77	79.84	84.30	88.74	79.82	84.28
20.0	89.42	80.29	84.85	89.39	80.27	84.83
25.0	89.98	80.67	85.32	89.93	80.65	85.29
30.0	90.46	80.97	85.72	90.42	80.95	85.69
35.0	90.91	81.25	86.08	90.88	81.23	86.05
40.0	91.34	81.50	86.42	91.30	81.48	86.39
45.0	91.75	81.75	86.75	91.71	81.72	86.71
50.0	92.13	81.98	87.05	92.09	81.95	87.02
55.0	9[illegible].47	82.18	87.33	9[illegible].43	82.15	87.29
60.0	92.82	82.39	87.60	92.77	82.36	87.56
65.0	93.33	82.70	88.02	93.23	82.64	87.93
70.0	94.04	83.13	88.59	93.93	83.06	88.49
75.0	94.71	83.60	89.15	94.59	83.51	89.05
80.0	95.51	84.16	89.83	95.39	84.07	89.73
85.0	96.21	84.65	90.43	96.19	84.63	90.41
90.0	96.75	85.03	90.89	96.75	85.03	90.89
95.0	97.81	85.76	91.78	97.82	85.78	91.80

TABLE XL

MAXIMUM OCTANE NUMBER REQUIREMENTS - 1983 SELECT MODELS

Model	No. Tested	PR	Research Octane No.		Motor Octane No.		(R+M)/2 Octane No.	
			FBRU	FBRSU	FBRU	FBRSU	FBRU	FBRSU
		----------50% Satisfied----------						
NGA 238A3/HGA 238A3/ IGA 238A3/LGA 238A3	18	88.4	91.9	92.9	84.1	82.5	88.0	87.7
NJP F20A3/LJP F20A3/ GJP F20A3	22	91.8	95.0	96.2	86.0	84.7	90.5	90.4
OA4 216A3/MA4 216A3	16	91.2	91.9	92.2	84.1	82.0	88.0	87.2
OD3 238A3/OD3 238A4/ MD3 238A3/OE3 238A3/ OE3 238A4/ME3 238A4	21	87.4	88.8	89.4	82.0	80.1	85.4	84.8
PKC 222A3/KKC 222A3/ DKC 222A3/KEC 222A3/ DEC 222A3	21*	87.0	89.6	91.5	82.5	81.5	86.1	86.5
		----------90% Satisfied----------						
NGA 238A3/HGA 238A3/ IGA 238A3/LGA 238A3	18	94.1	99.6	101.3	89.4	88.4	94.5	94.9
NJP F20A3/LJP F20A3/ GJP F20A3	22	95.0	98.0	100.0	88.0	87.3	93.0	93.6
OA4 216A3/MA4 216A3	16	93.9	95.2	95.8	86.1	84.3	90.6	90.1
OD3 238A3/OD3 238A4/ MD3 238A3/OE3 238A3/ OE3 238A4/ME3 238A4	21	91.9	93.3	93.9	85.0	83.3	89.1	88.6
PKC 222A3/KKC 222A3/ DKC 222A3/KEC 222A3/ DEC 222A3	21*	92.1	95.5	98.1	86.5	86.0	91.0	92.1

* FBRU; 20 cars tested for PRF and FBRSU Fuels

TABLE XLI

OWNER/RATER COMPARISON OF TANK FUEL KNOCK

(1976-1983 CRC Octane Number Requirement Surveys)

	1983	1982	1981	1980	1979	1978	1977	1976
Fuel:	Unleaded	Unleaded	Unleaded	Unleaded*	Unleaded*	Unleaded*	Unleaded*	Unleaded*
No. of Reports:	129	144	149	218	196	105	225	200
% Knocking								
Trained Rater	59.7	47.9	43.6	51.1	52.6	50.5	54.7	63.8
Owner	29.5	25.0	29.5	31.2	26.0	32.4	29.3	40.5
Owner/Rater Ratio	0.49	0.52	0.68	0.61	0.49	0.64	0.54	0.63
% Owners Objecting								
Based on Total Reports	12.4	13.2	12.1	15.1	15.8	15.2	10.2	20.0
Based on Those Reporting Knock	42.1	52.8	40.9	48.5	60.8	46.9	34.8	49.4

* Some vehicles were designed for leaded fuels.

TABLE XLII

TANK-FUEL KNOCK REPORTED BY TRAINED OBSERVERS

I. US and Imported Vehicles

Model Year	No. in Survey	Vehicles Tested on Tank Fuel		
		No. Tested	No. Knocking	% Knocking (Wtg. Avg.)
1983	383	314	--	44.6
1982	434	342	--	41.6
1981	417	326	--	42.9
1980	429	374	--	49.9
1979	490	414	--	47.3
1978	434	338	--	47.2
1977	478	457	--	44.2

II. 1983 Select Models

				% Knocking
NGA 238A3/HGA 238A3/ IGA 238A3/LGA 238A3	18	14	6	42.9
NJP F20A3/LJP F20A3/ GJP F20A3	22	22	20	90.9
OA4 216A3/MA4 216A3	16	12	9	75.0
OD3 238A3/OD3 238A4/ MD3 238A3/OE3 238A3/ OE3 238A4/ME3 238A4	21	16	2	12.5
PKC 222A3/KKC 222A3/ DKC 222A3/KEC 222A3/ DEC 222A3	21	16	5	31.3

TABLE XLIII

ENGINE SPEEDS FOR MAXIMUM OCTANE NUMBER REQUIREMENTS - 1983 SELECT MODELS

Percent of Cars Having Maximum Requirements Within Specified Speed (rpm) Ranges

Model:	NGA 238A3/HGA 238A3 IGA 238A3/LGA 238A3			NJP F20A3/LJP F20A3/ GJP F20A3			OA4 216A3/MA4 216A3		
Fuel:	PR	FBRU	FBRSU	PR	FBRU	FBRSU	PR	FBRU	FBRSU
SPEED RANGE									
1599 and Lower	12	11	6	9	9	14	31	63	44
1600 - 1999	76	61	61	23	32	23	38	19	31
2000 - 2399	12	28	28	14	9	9	19	6	6
2400 - 2799			5	14	27	32	6	12	19
2800 - 3199				40	18	13	6		
3200 and Higher					5	9			
No. of Cars	18	18	18	22	22	22	16	16	16

Model:	OD3 238A3/OD3 238A4/ MD3 238A3/OE3 238A3/ OE3 238A4/ME3 238A4			PKC 222A3/KKC 222A3/ DKC 222A3/KEC 222A3/ DEC 222A3		
Fuel:	PR	FBRU	FBRSU	PR	FBRU	FBRSU
SPEED RANGE						
1599 and Lower	38	52	48			5
1600 - 1999	29	24	24	35	43	35
2000 - 2399	19	14	9	35	29	25
2400 - 2799	14	5	14	30	28	30
2800 - 3199		5	5			
3200 and Higher						5
No. of Cars	21	21	21	20	21	20

TABLE XLIV

ENGINE SPEEDS FOR MAXIMUM OCTANE NUMBER REQUIREMENTS

Weighted % of Vehicles Having Requirements
in Indicated (rpm) Ranges

All 1983 Vehicles

Maximum Requirements Engine Speed Range	PR Fuels	FBRU Fuels	FBRSU Fuels
1599 and Lower	24.9	26.9	25.2
1600 - 1999	37.3	34.1	28.2
2000 - 2399	19.7	16.4	17.5
2400 - 2799	10.5	12.9	16.5
2800 - 3199	5.4	6.2	6.9
3200 - 3599	2.2	2.9	4.3
3600 and Higher	0.0	0.6	1.4

TABLE XLV

ROAD OCTANE DEPRECIATION OF 1983 FBRU AND FBRSU FUELS

All 1983 Vehicles

Includes High Borderline Requirements for Knock Sensor-Equipped Vehicles

	FBRU Fuels				FBRSU Fuels			
RON	% Satisfied	Sensitivity	Road Octane Rating	Depreciation	% Satisfied	Sensitivity	Road Octane Rating	Depreciation
85	5.4	5.4	83.6	1.4	4.0	7.9	-	-
86	8.0	5.7	84.5	1.5	6.3	8.2	84.0	2.0
87	13.0	6.1	85.7	1.3	9.9	8.5	85.0	2.0
88	20.5	6.4	86.8	1.2	14.8	8.7	86.0	2.0
89	28.9	6.8	87.6	1.4	22.9	9.0	87.0	2.0
90	39.4	7.2	88.5	1.5	33.2	9.3	87.4	2.1
91	53.2	7.5	89.6	1.4	43.8	9.7	88.8	2.2
92	66.3	7.9	90.7	1.3	56.8	10.1	89.9	2.1
93	74.6	8.3	91.4	1.6	67.8	10.5	90.8	2.2
94	80.9	8.6	92.0	2.0	74.6	10.9	91.4	2.6
95	86.1	9.0	92.8	2.1	80.0	11.2	91.9	3.1
96	89.9	9.3	93.6	2.4	83.8	11.5	92.4	3.6
97	93.3	9.7	94.6	2.4	88.5	11.8	93.3	3.7
98	95.4	10.0	95.4	2.6	92.0	12.1	94.2	3.8
99	96.8	10.2	96.1	2.9	94.5	12.4	95.1	3.9
100	97.3	10.5	96.5	3.5	95.6	12.7	95.5	4.5
101	97.9	10.7	96.8	4.2	96.6	12.9	96.0	5.0

FIGURE 1

DISTRIBUTION OF ODOMETER MILEAGE
FOR 1983 MODEL VEHICLES TESTED

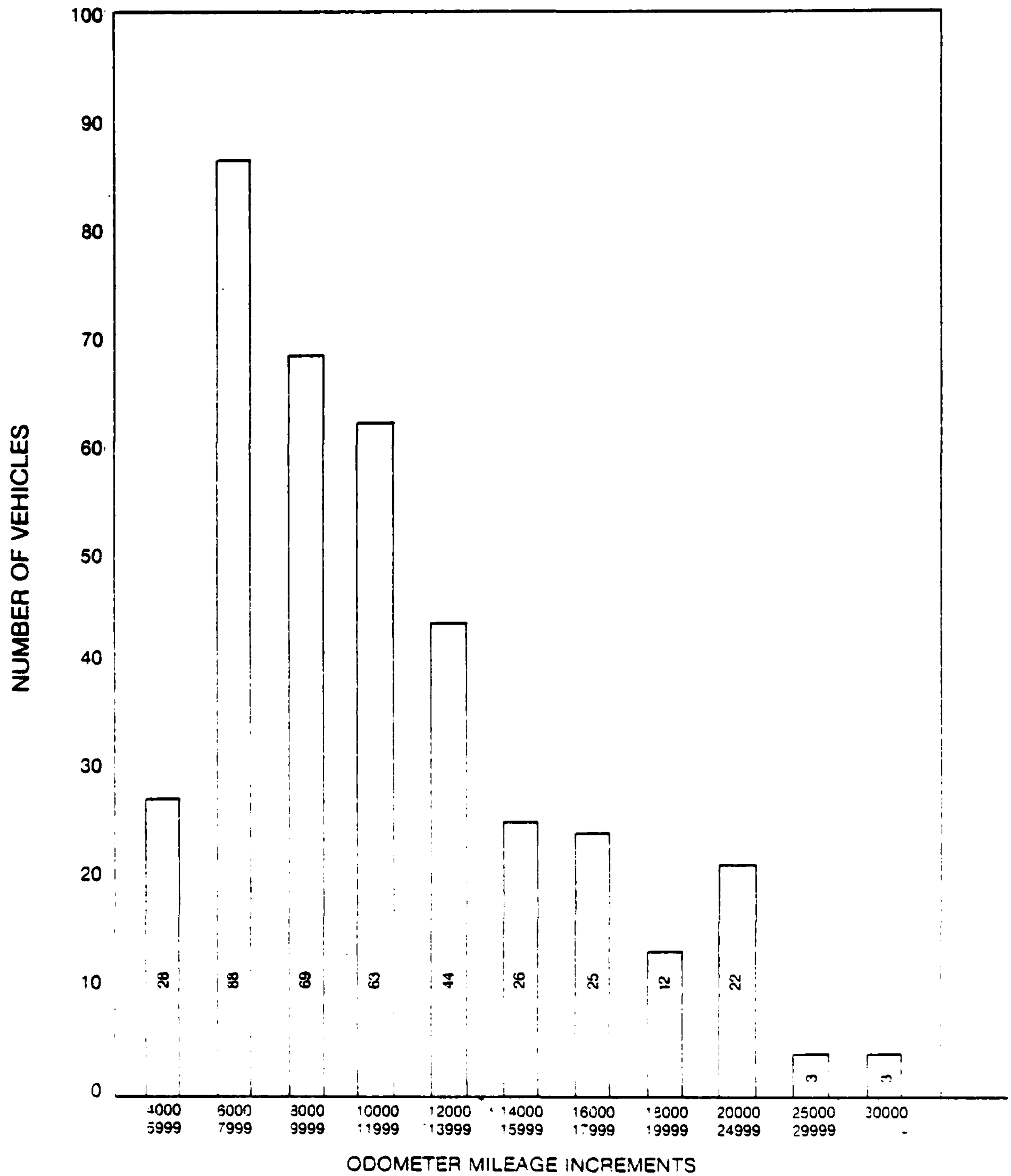


Figure 2a

DISTRIBUTION OF MAXIMUM PR FUEL REQUIREMENTS
1983 U.S. AND IMPORTED VEHICLES

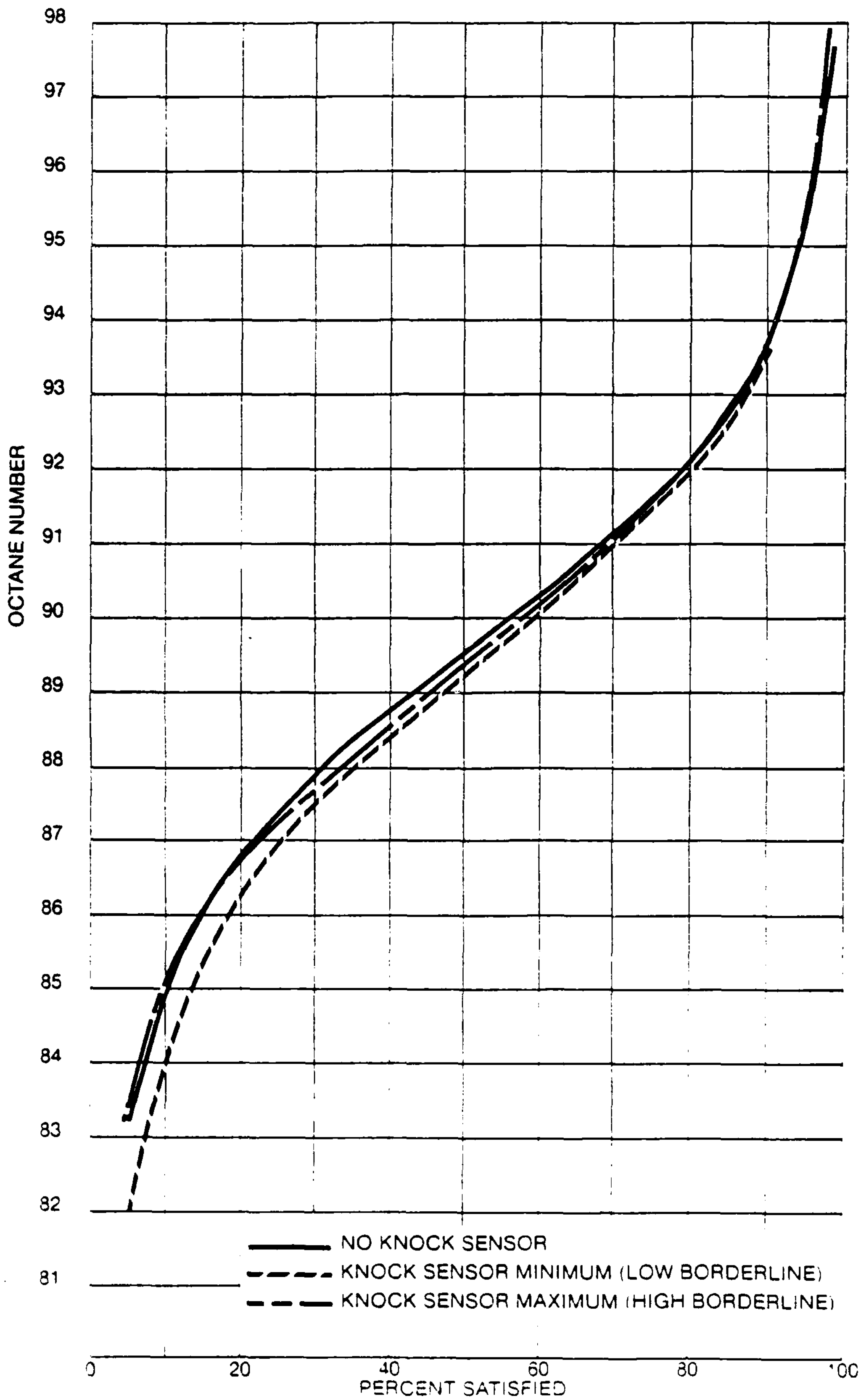


Figure 2b

DISTRIBUTION OF MAXIMUM PR FUEL REQUIREMENTS
1983 U.S. AND IMPORTED VEHICLES

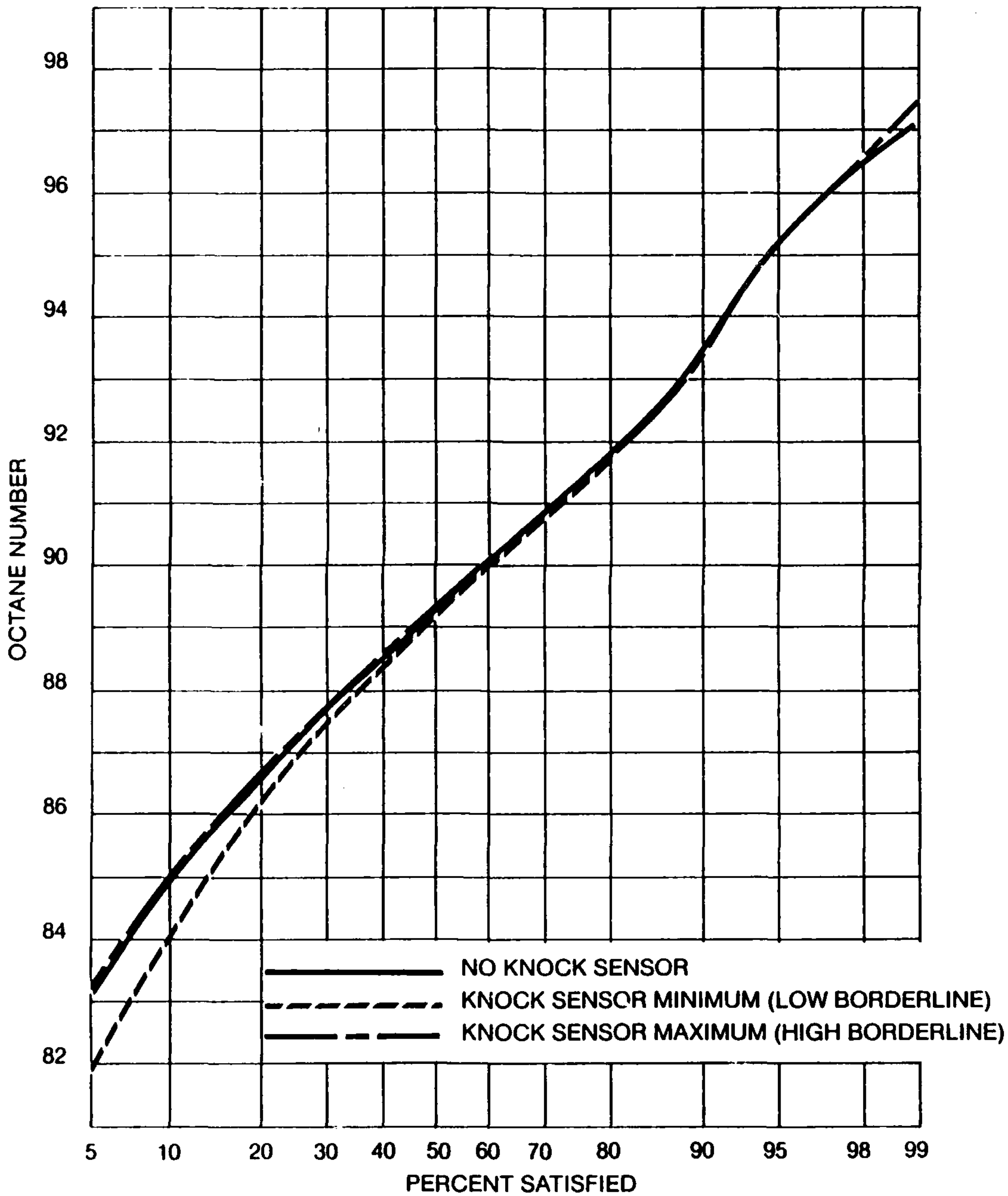


Figure 3a

DISTRIBUTION OF MAXIMUM FBRU RON REQUIREMENTS
1983 U.S. AND IMPORTED VEHICLES

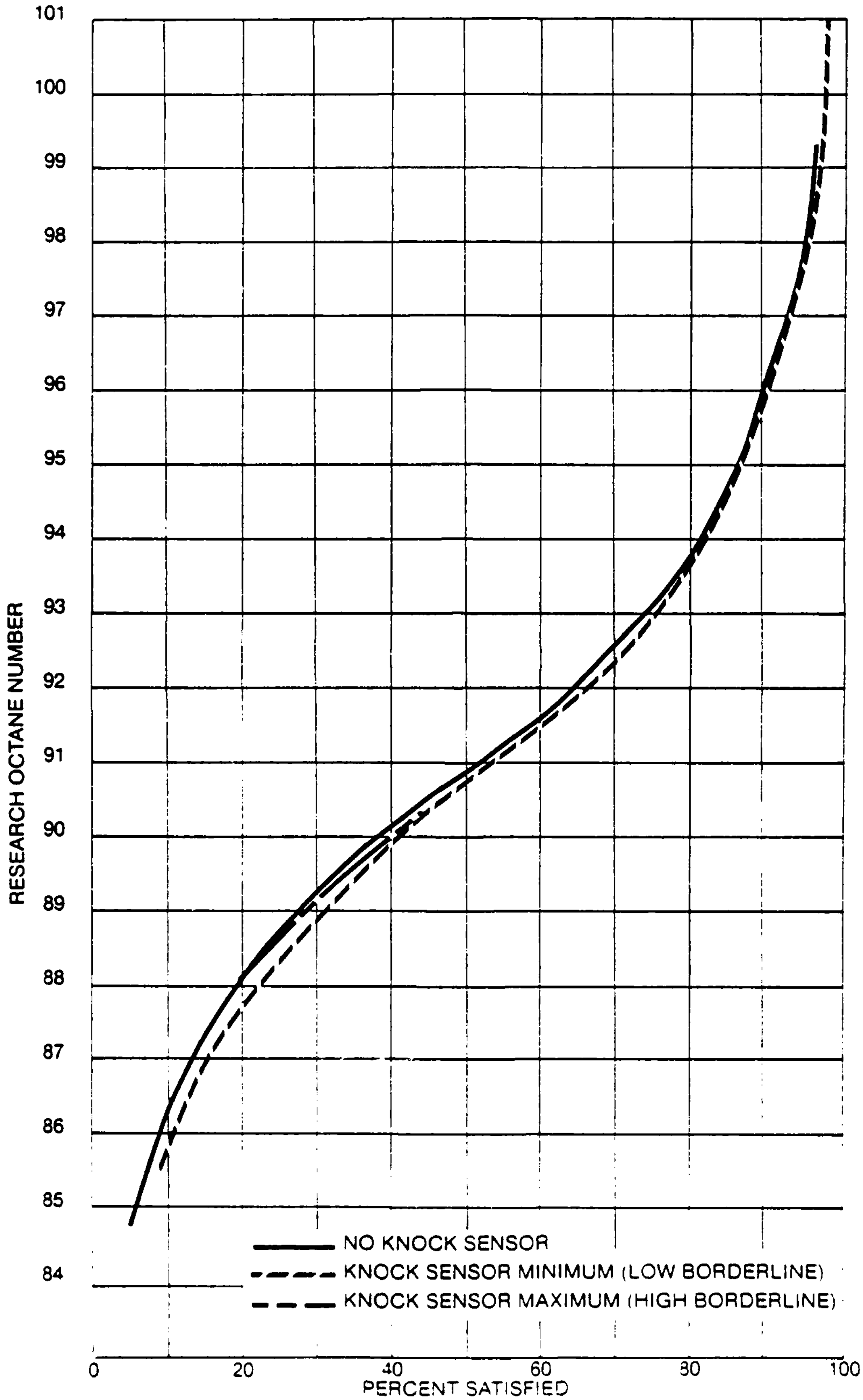


Figure 3b

DISTRIBUTION OF MAXIMUM FBRU RON REQUIREMENTS
1983 U.S. AND IMPORTED VEHICLES

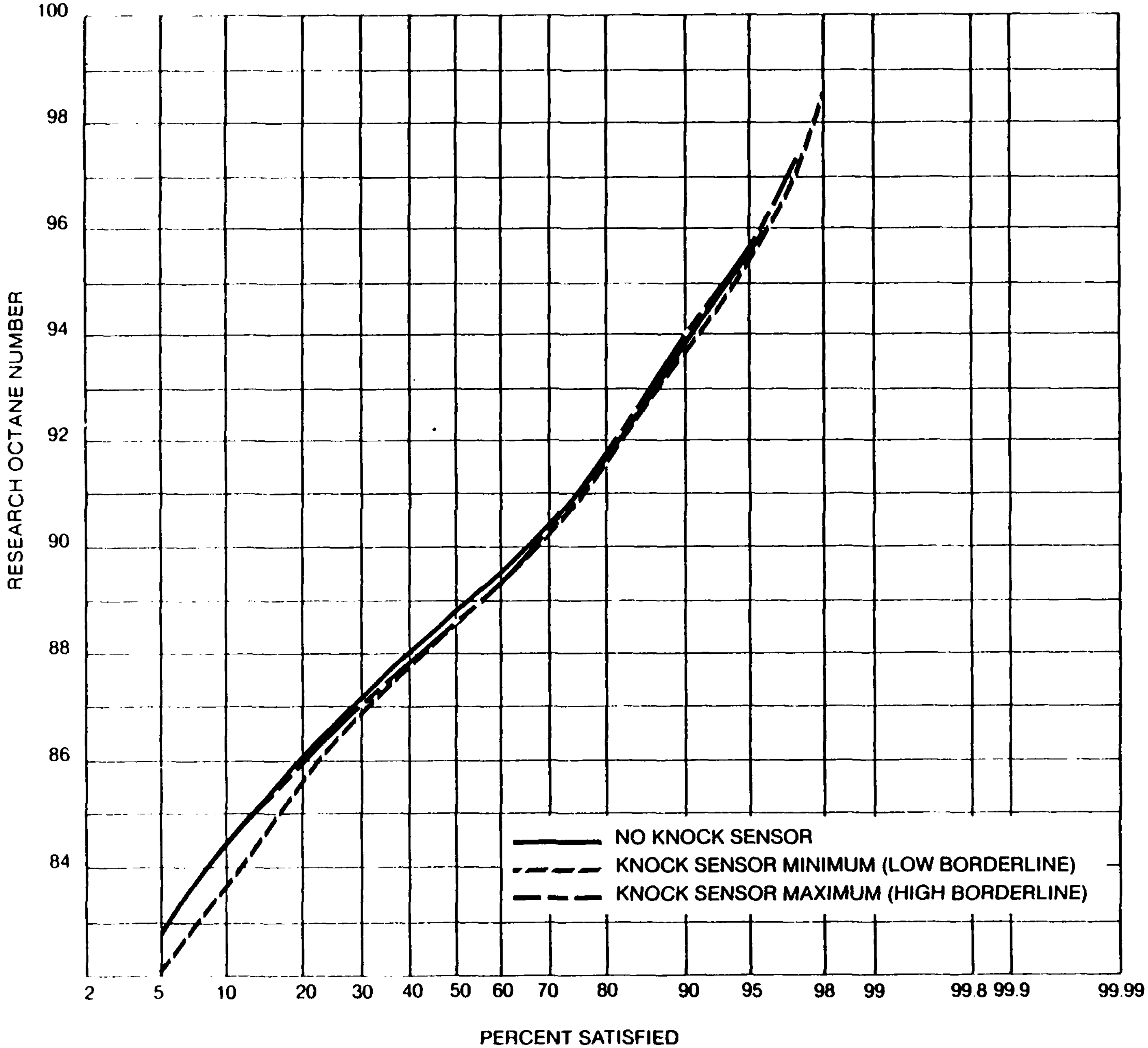


Figure 4a

DISTRIBUTION OF MAXIMUM FBRSU RON REQUIREMENTS
1983 U.S. AND IMPORTED VEHICLES

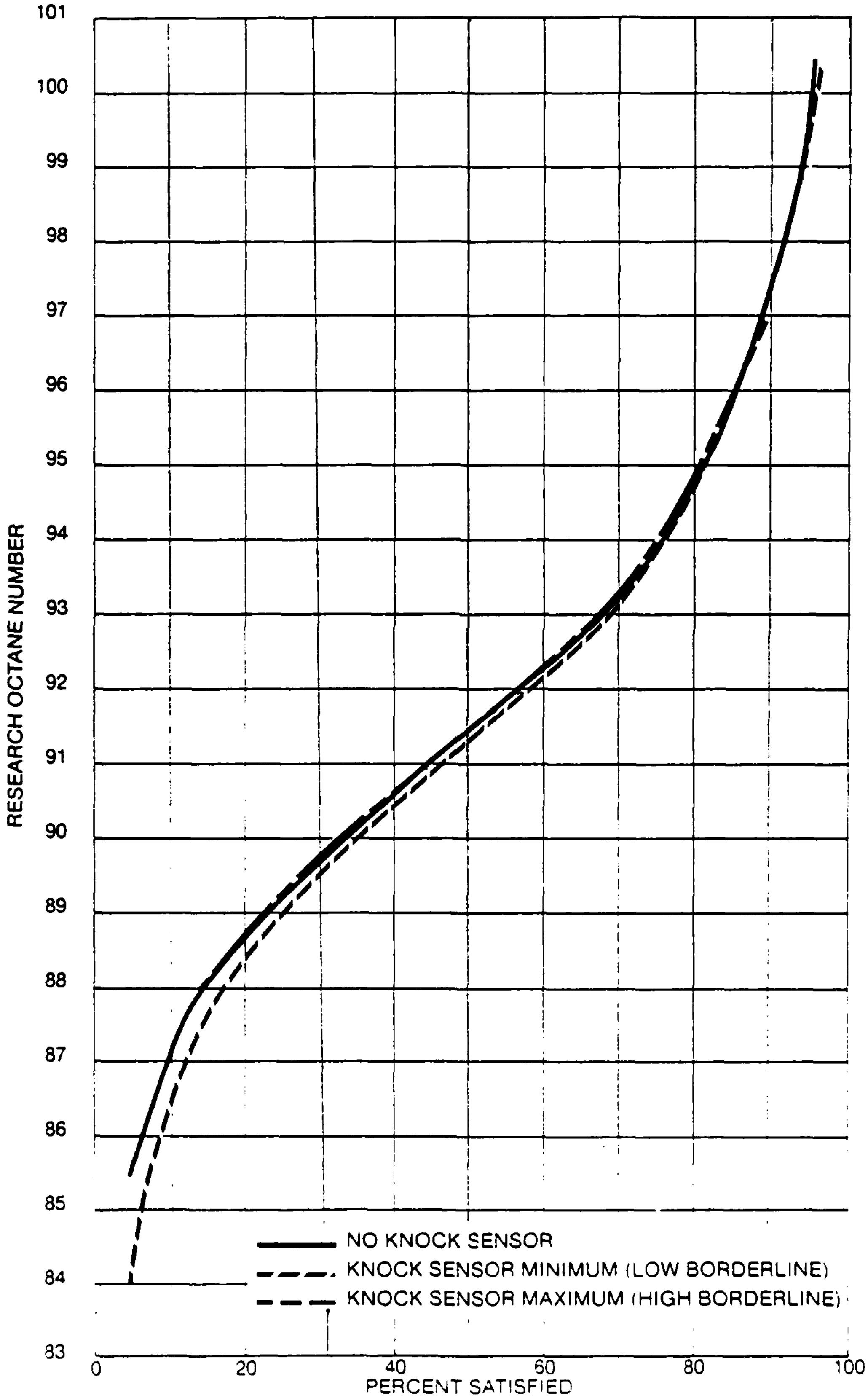


Figure 4b

DISTRIBUTION OF MAXIMUM FBRSU RON REQUIREMENTS
1983 U.S. AND IMPORTED VEHICLES

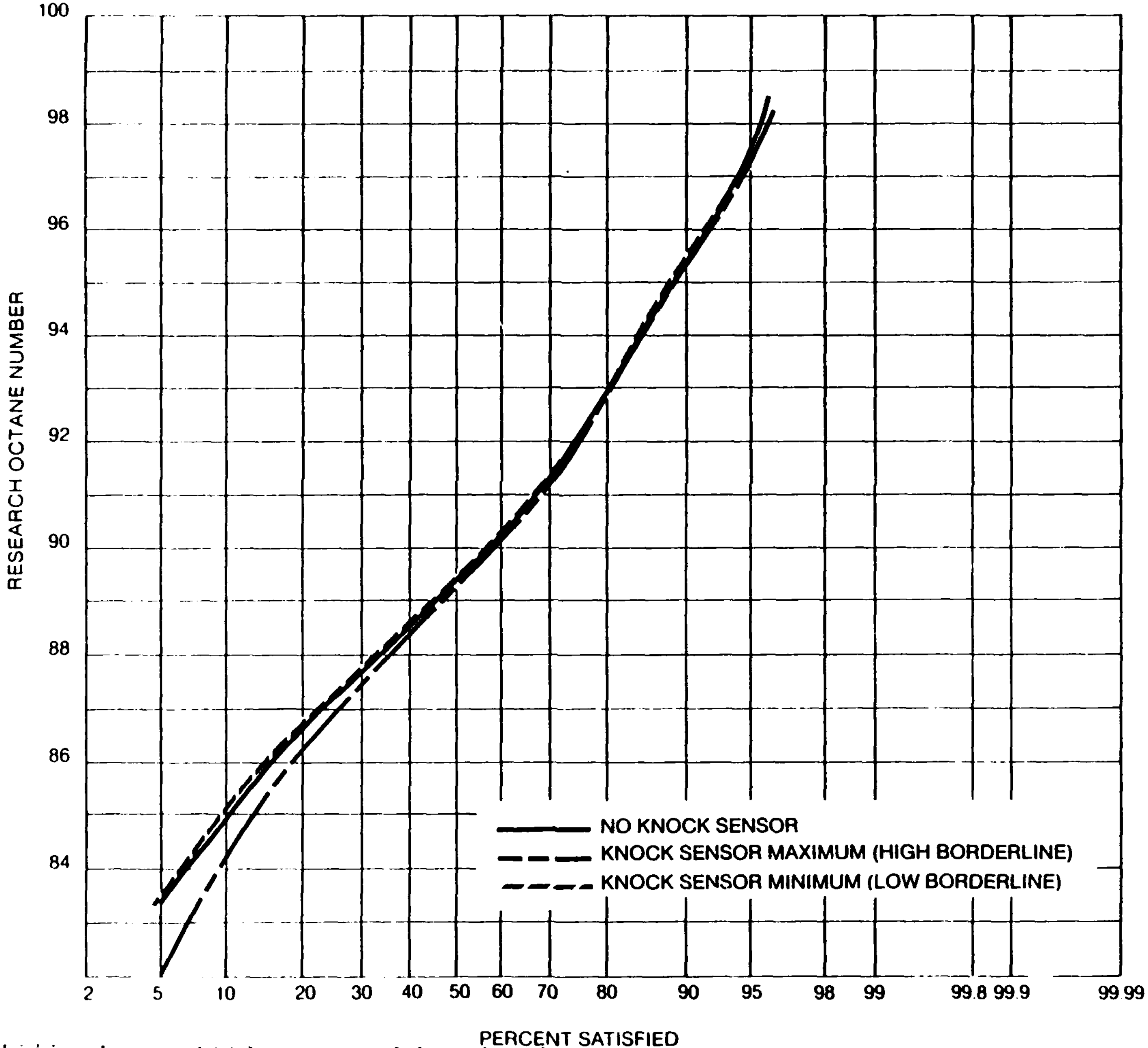


Figure 5a

DISTRIBUTION OF MAXIMUM RON REQUIREMENTS
1983 U.S. AND IMPORTED VEHICLES

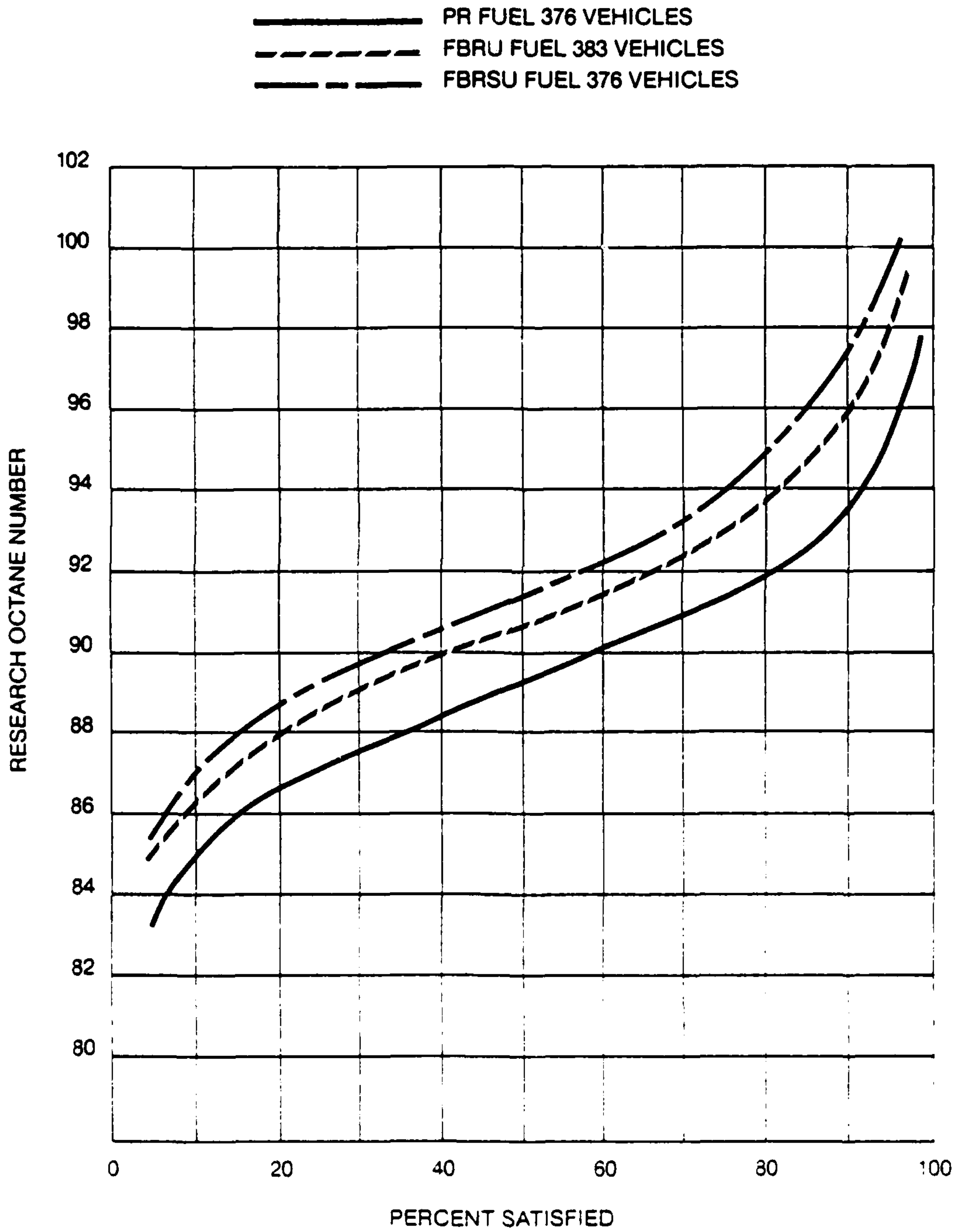


Figure 5b

DISTRIBUTION OF MAXIMUM RON REQUIREMENTS
1983 U.S. AND IMPORTED VEHICLES

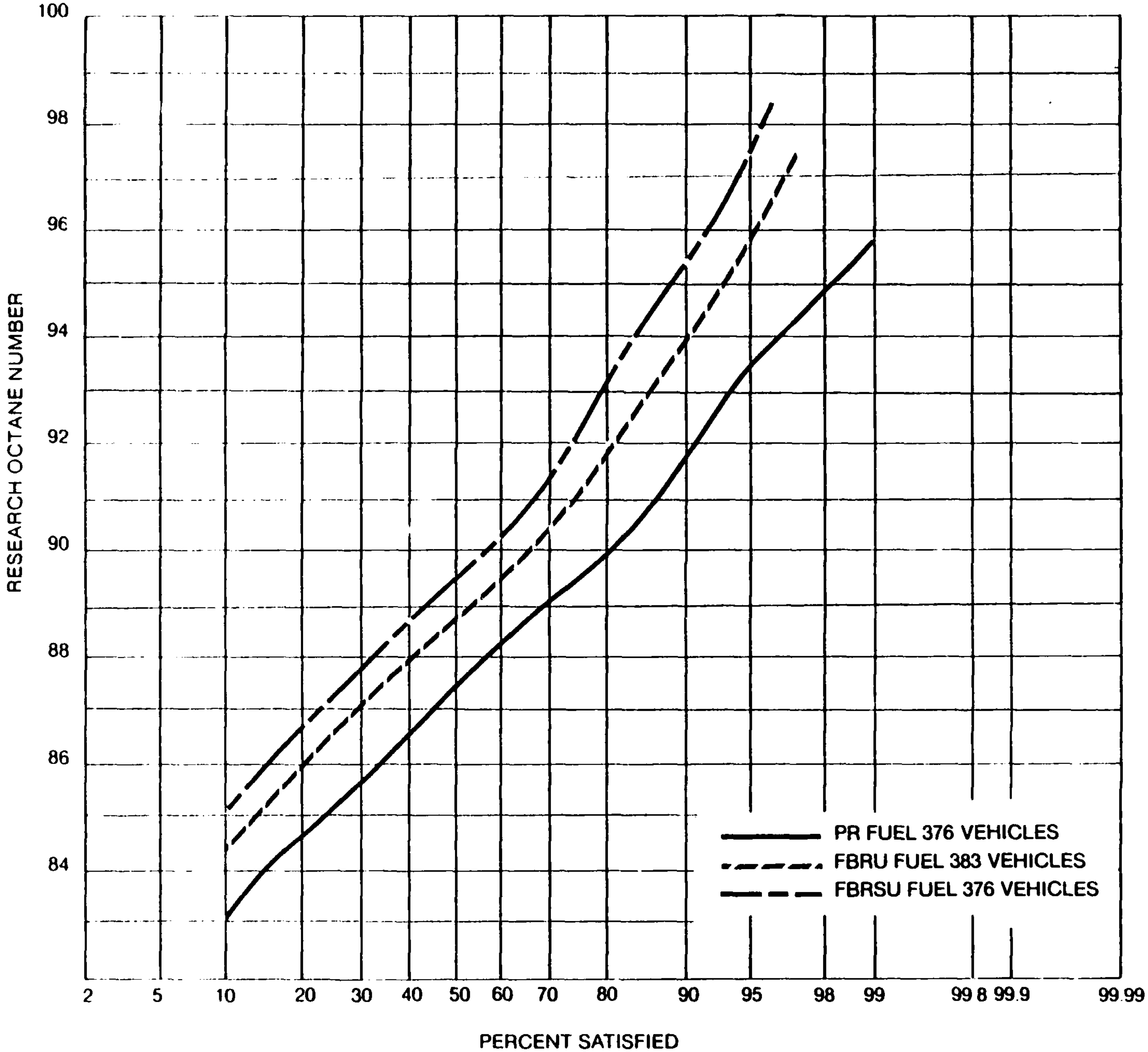


Figure 6

COMPARISON OF MAXIMUM PR FUEL REQUIREMENTS
1983 AND 1982 U.S. AND IMPORTED VEHICLES

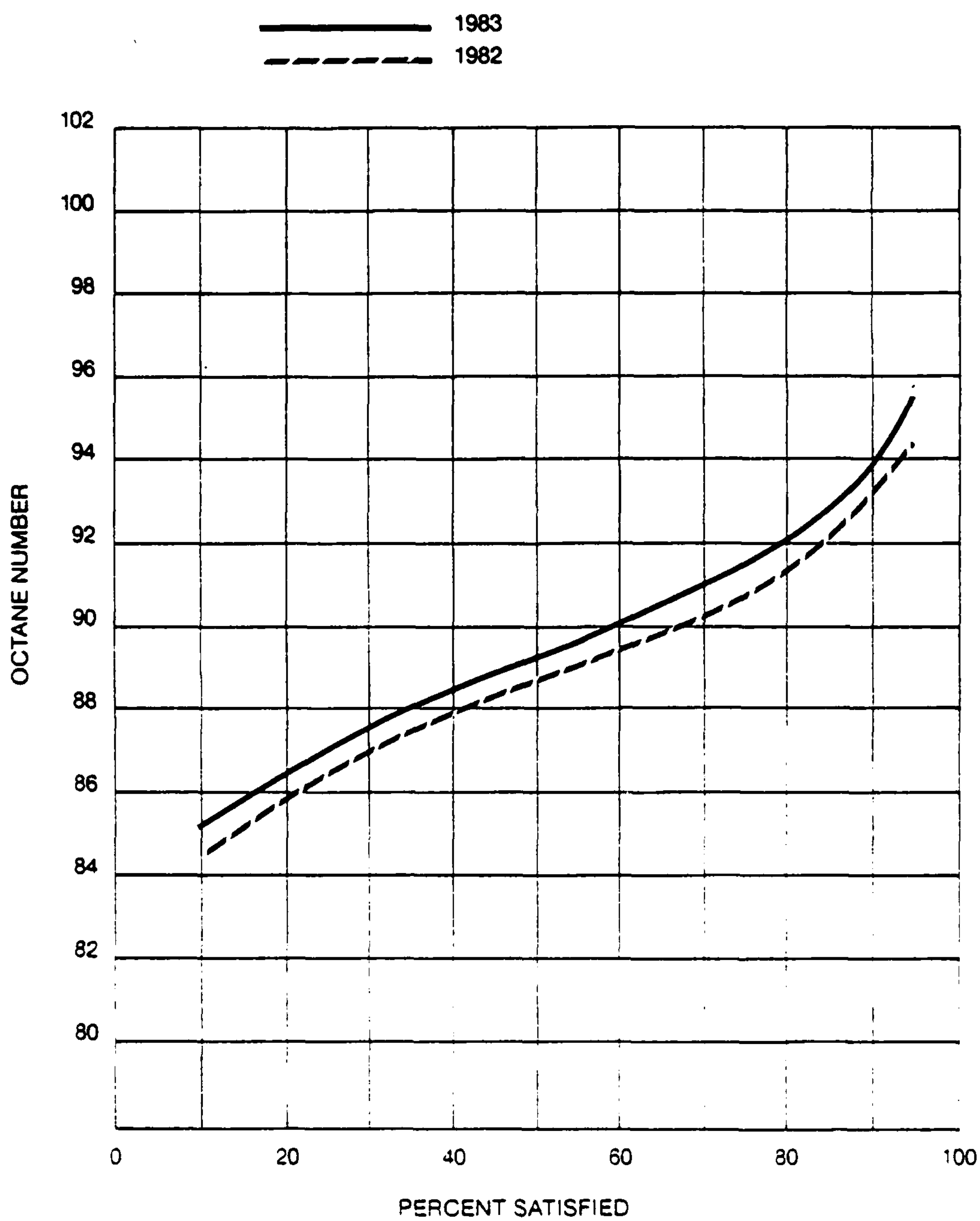


Figure 7

COMPARISON OF MAXIMUM FBRU FUEL REQUIREMENTS
1983 AND 1982 U.S. AND IMPORTED VEHICLES

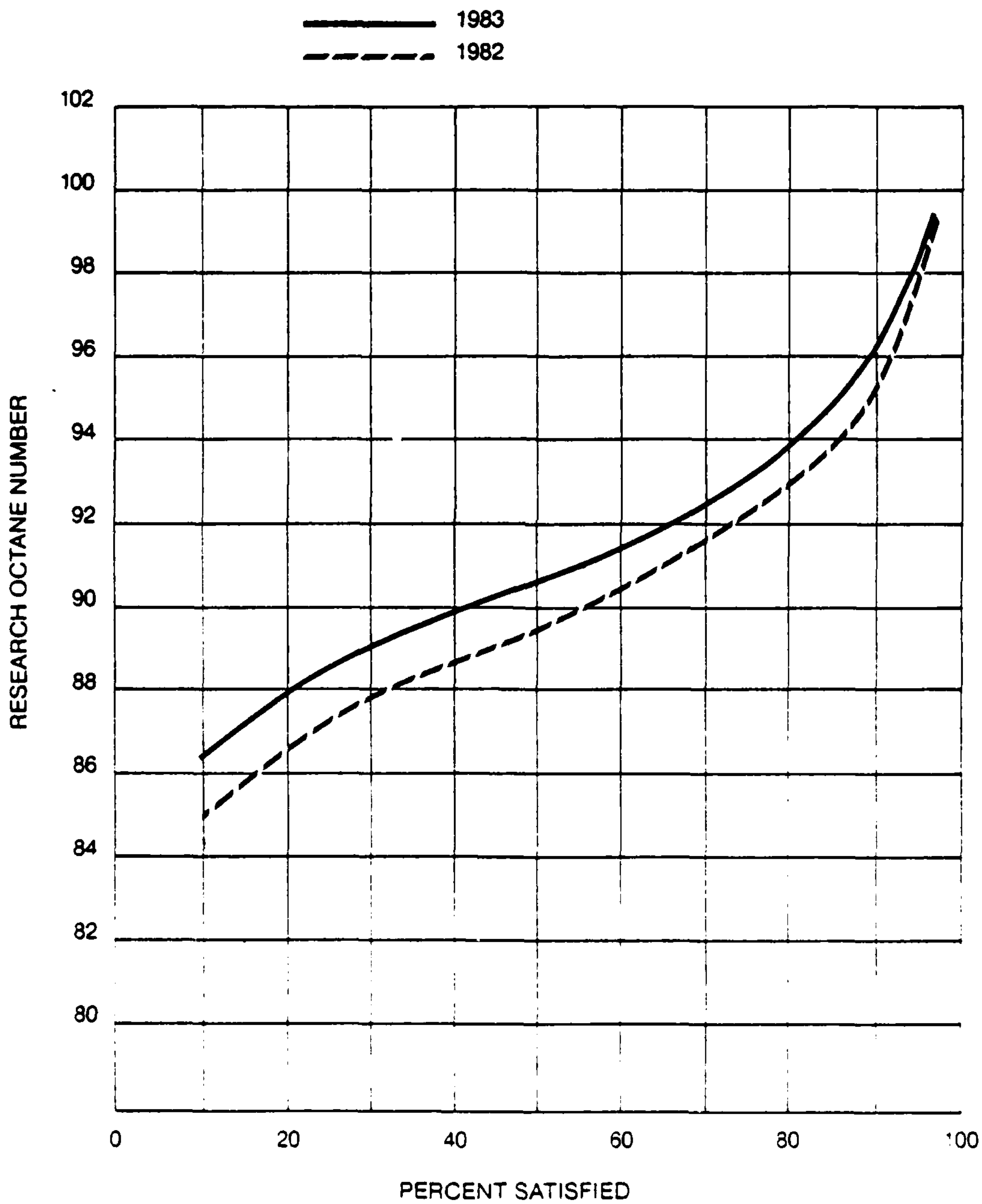


Figure 8

COMPARISON OF MAXIMUM FBRSU FUEL REQUIREMENTS
1983 AND 1982 U.S. AND IMPORTED VEHICLES

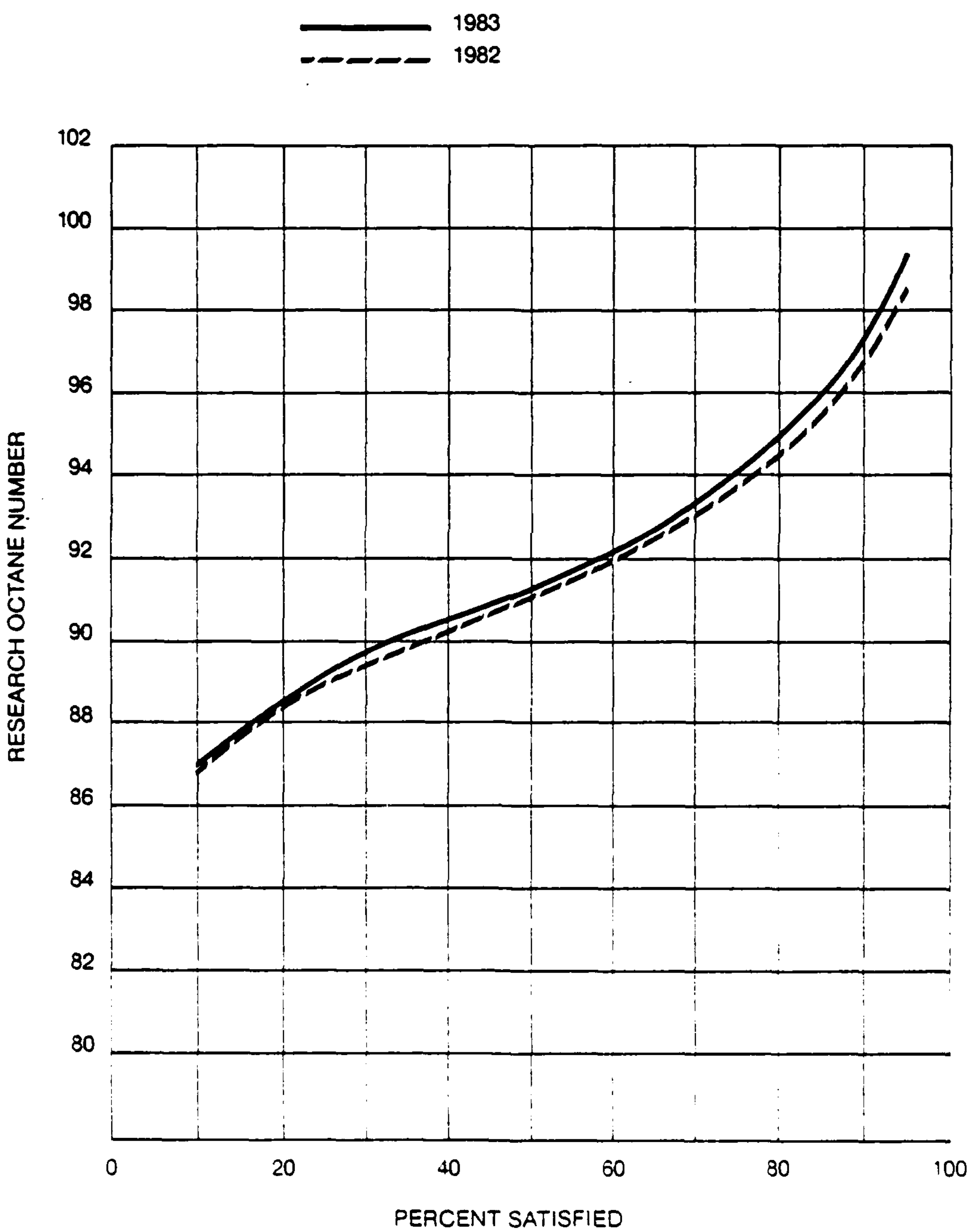


Figure 9a

DISTRIBUTION OF MAXIMUM RON REQUIREMENTS
1983 U.S. AND IMPORTED CARS

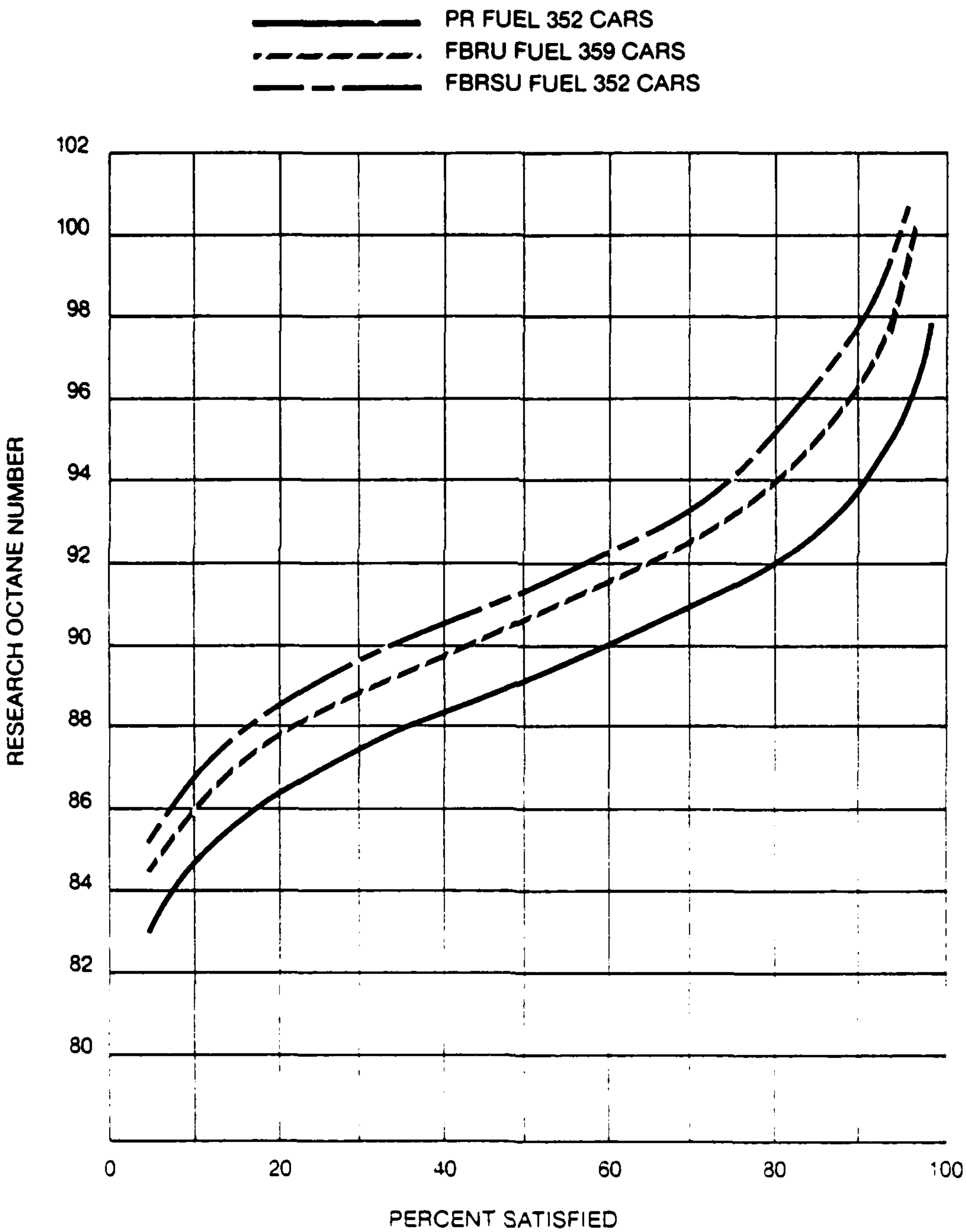


Figure 9b

DISTRIBUTION OF MAXIMUM RON REQUIREMENTS
1983 U.S. AND IMPORTED CARS

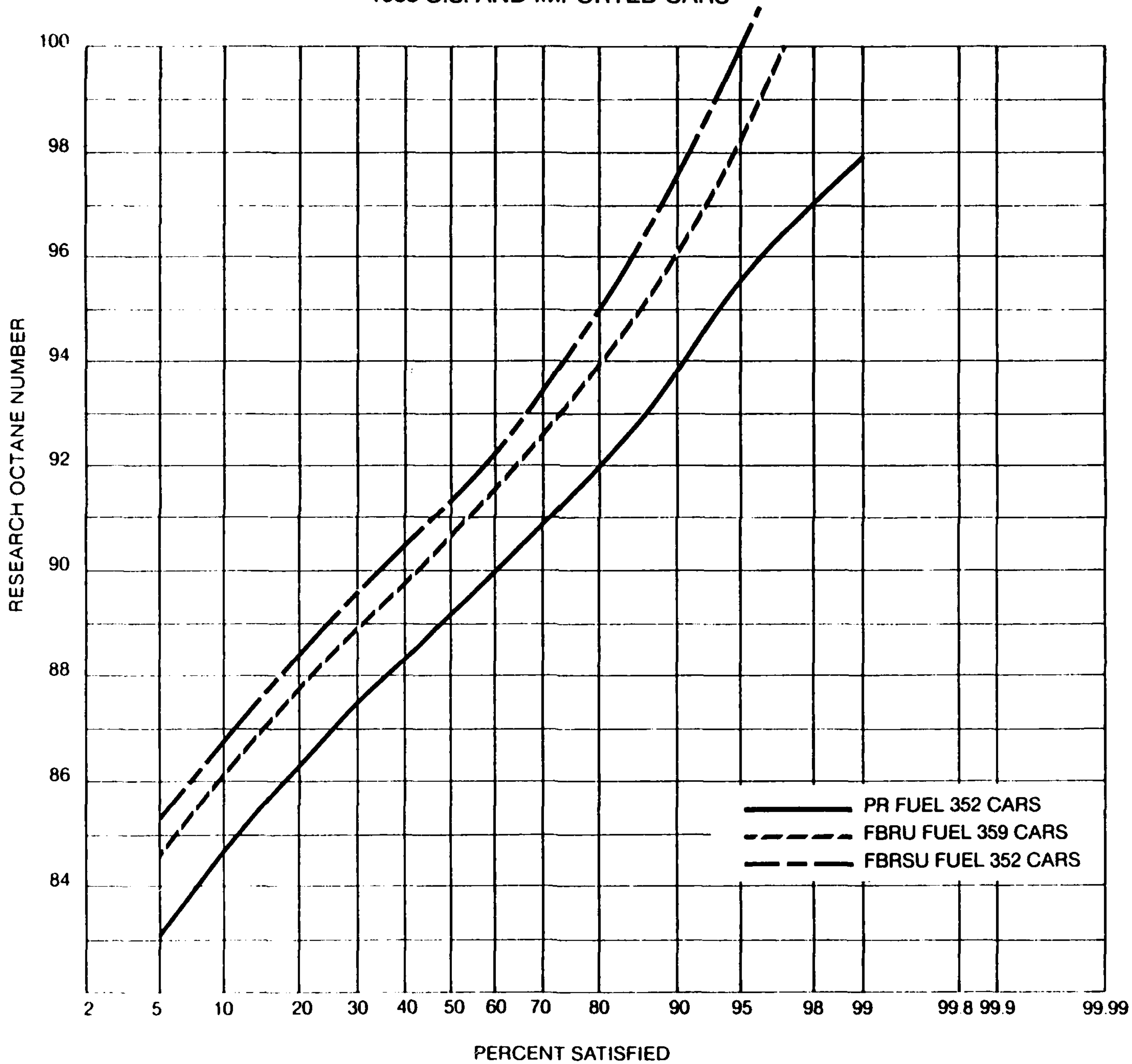


Figure 10a

DISTRIBUTION OF MAXIMUM RON REQUIREMENTS
1983 U.S. VEHICLES

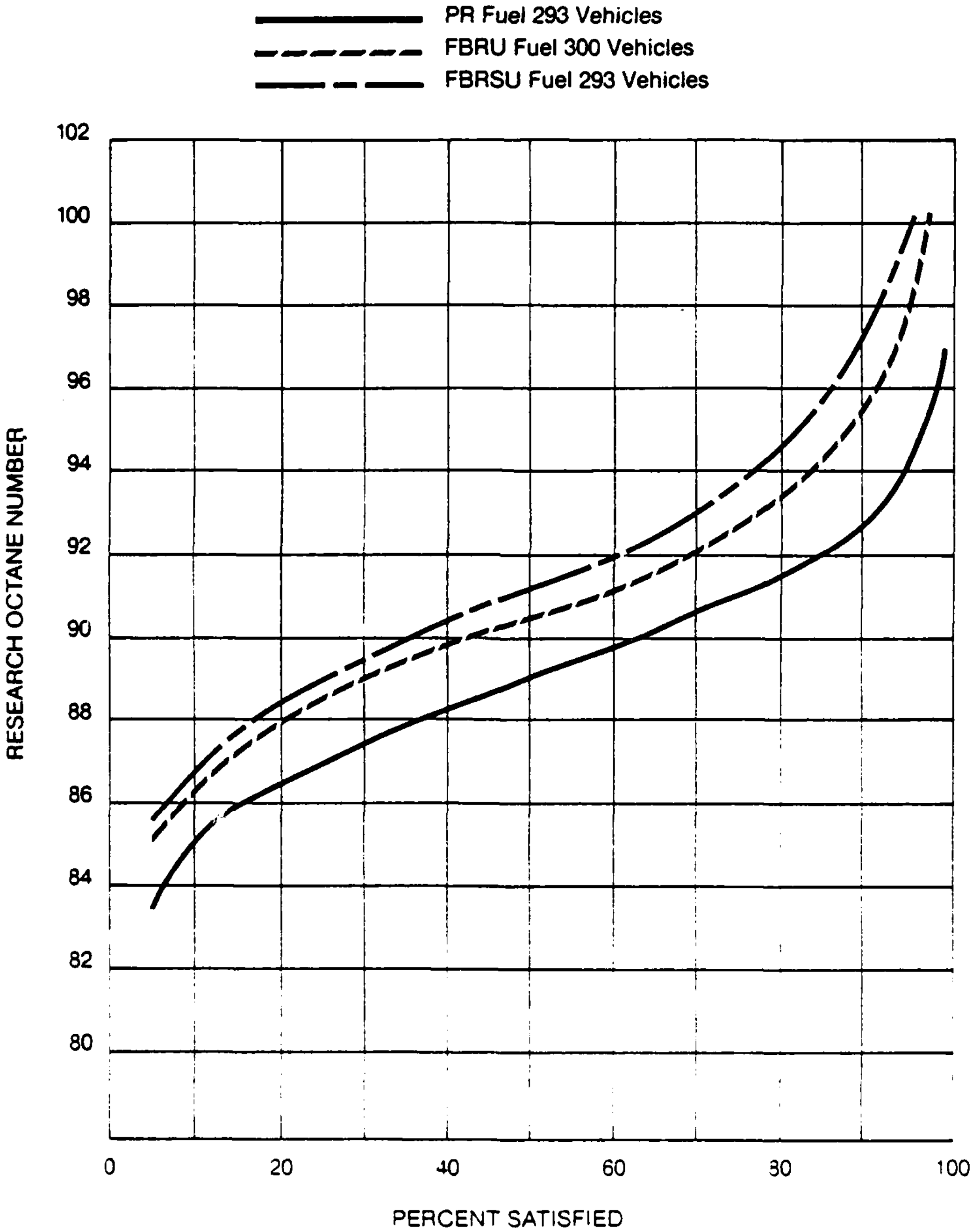
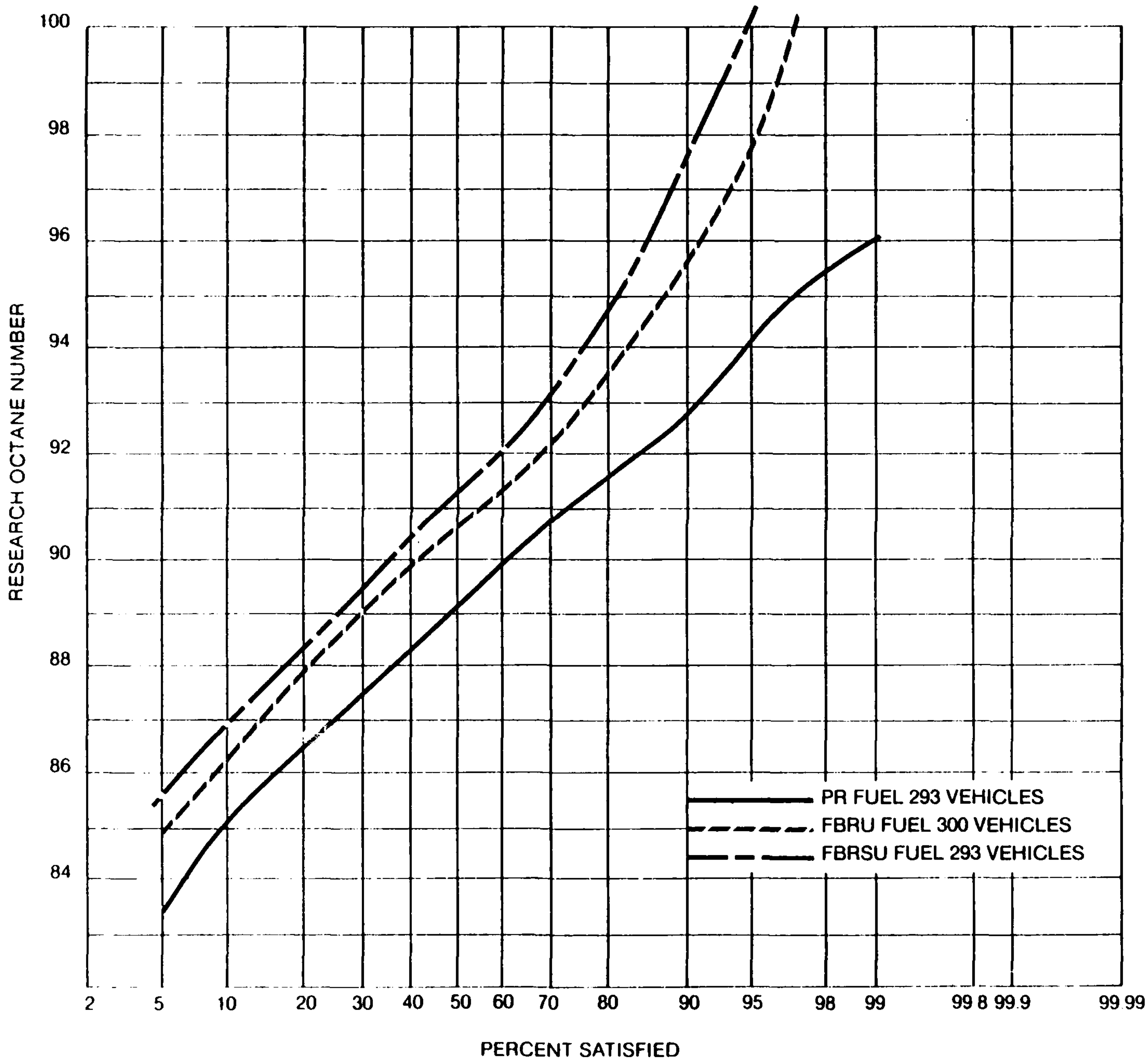


Figure 10b

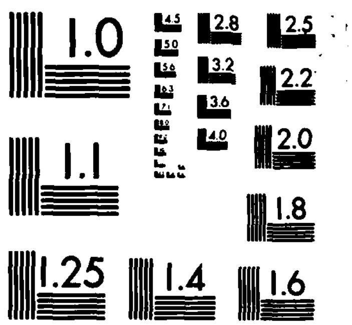
DISTRIBUTION OF MAXIMUM RON REQUIREMENTS
1983 U.S. VEHICLES



AD-A145 816 1983 CRC (COORDINATING RESEARCH COUNCIL INC) OCTANE NUMBER REQUIREMENT SURVEY(U) COORDINATING RESEARCH COUNCIL INC ATLANTA GA AUG 83 CRC-539 DAAK70-81-C-0128

2/3

UNCLASSIFIED F/G 21/4 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Figure 11

COMPARISON OF MAXIMUM PR FUEL REQUIREMENTS
1983 AND 1982 U.S. VEHICLES

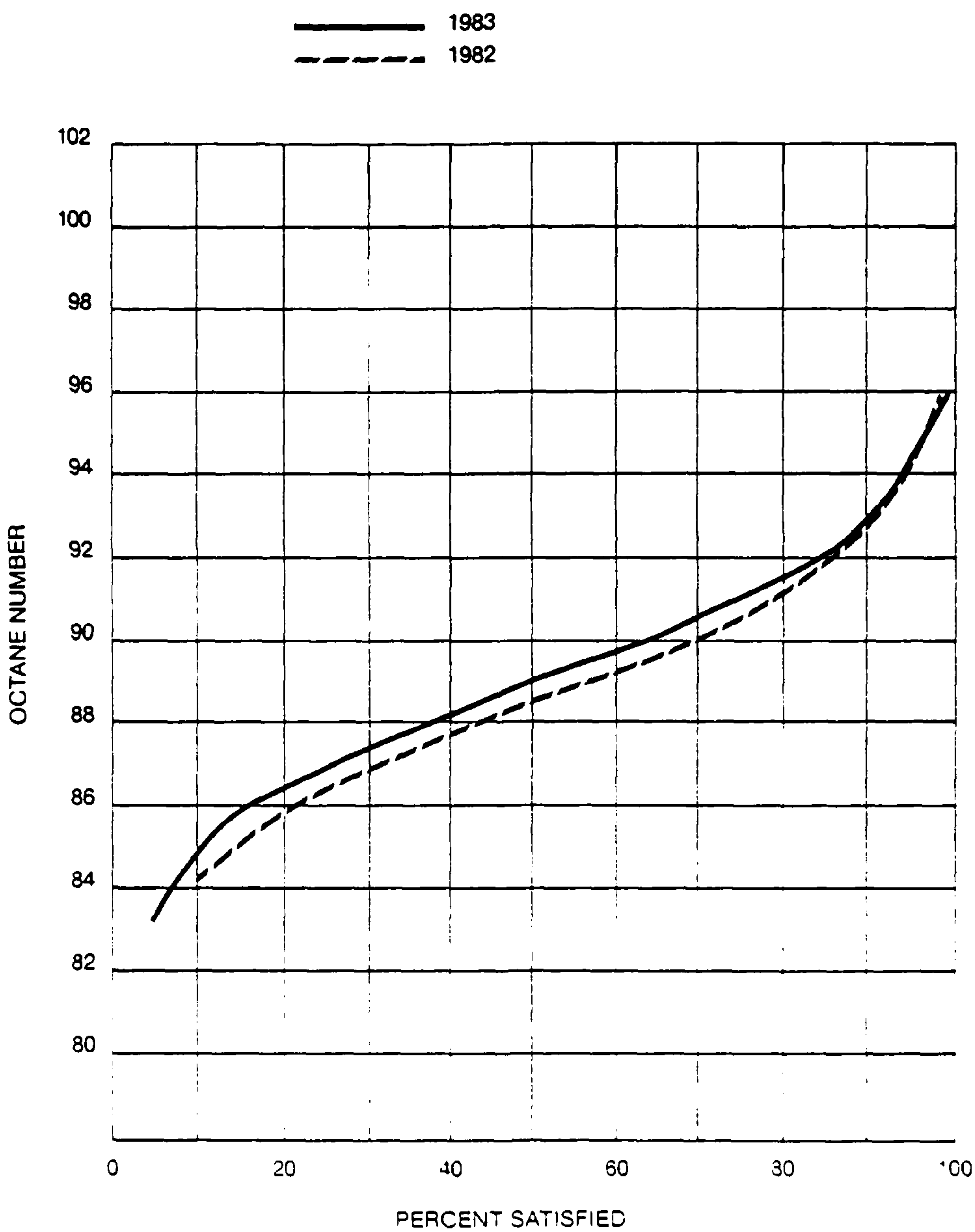


Figure 12

COMPARISON OF MAXIMUM FBRU FUEL REQUIREMENTS
1983 AND 1982 U.S. VEHICLES

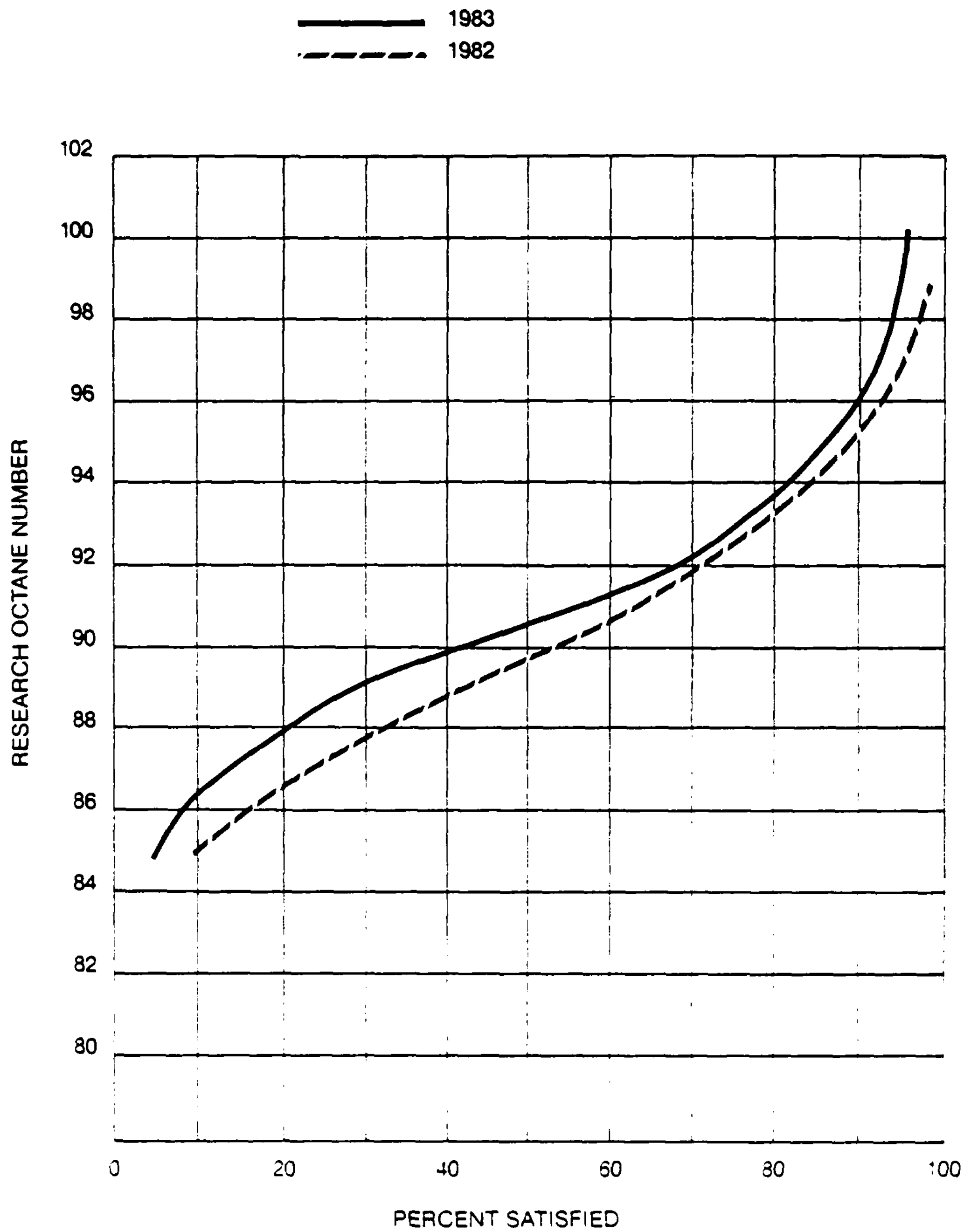


Figure 13

COMPARISON OF MAXIMUM FBRSU FUEL REQUIREMENTS
1983 AND 1982 U.S. VEHICLES

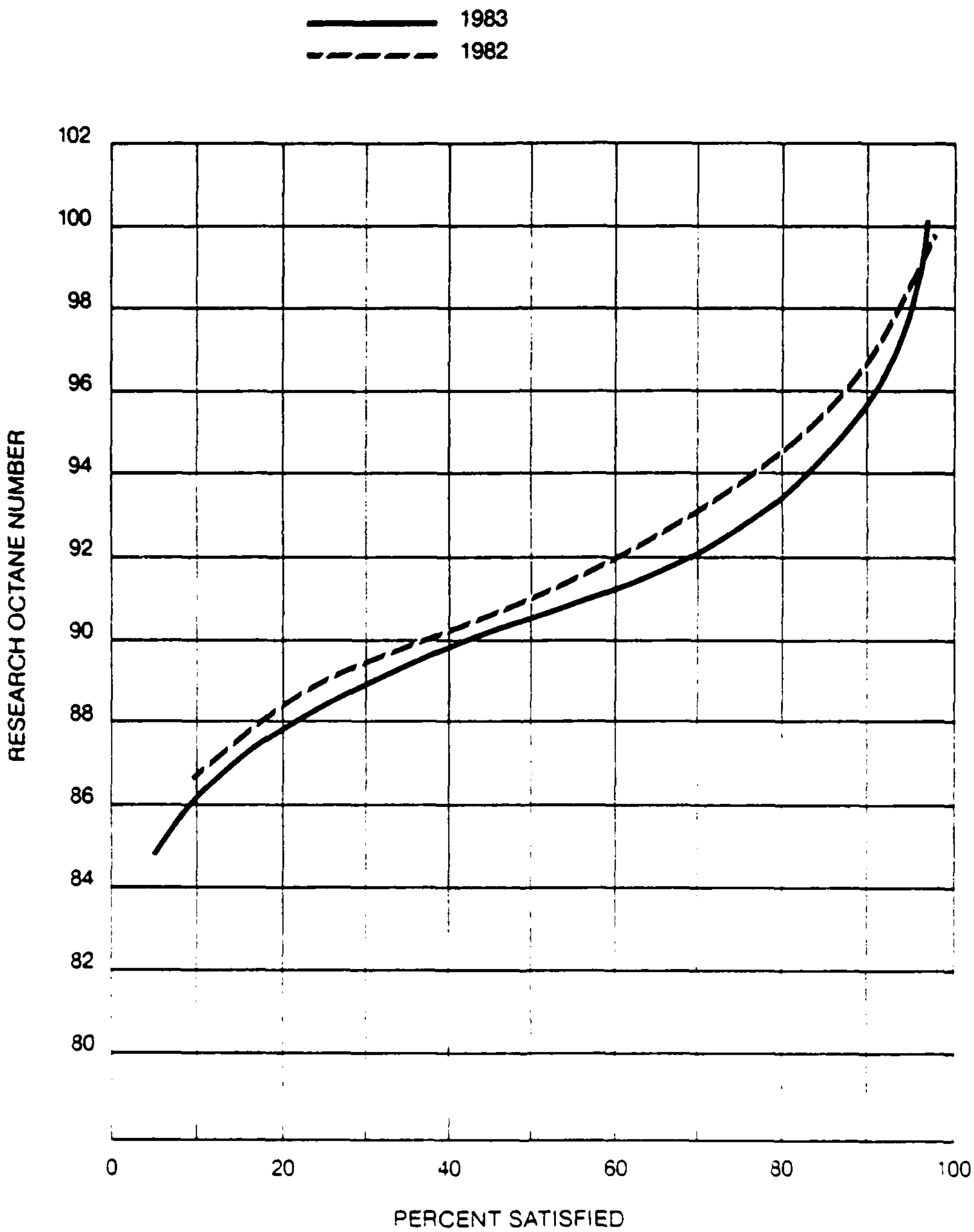


Figure 14a

DISTRIBUTION OF MAXIMUM RON REQUIREMENTS
1983 U.S. CARS

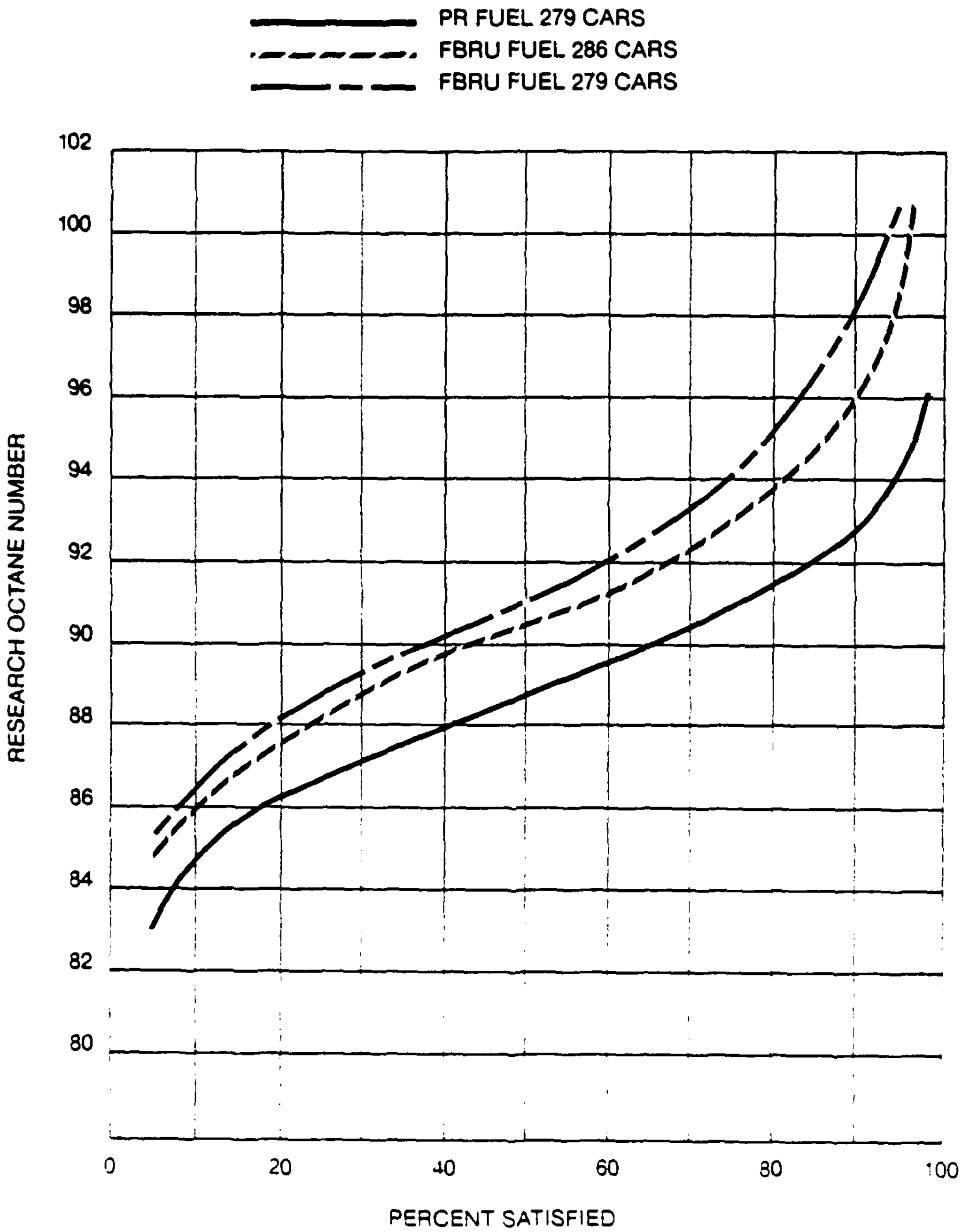


Figure 14b

DISTRIBUTION OF MAXIMUM RON REQUIREMENTS
1983 U.S. CARS

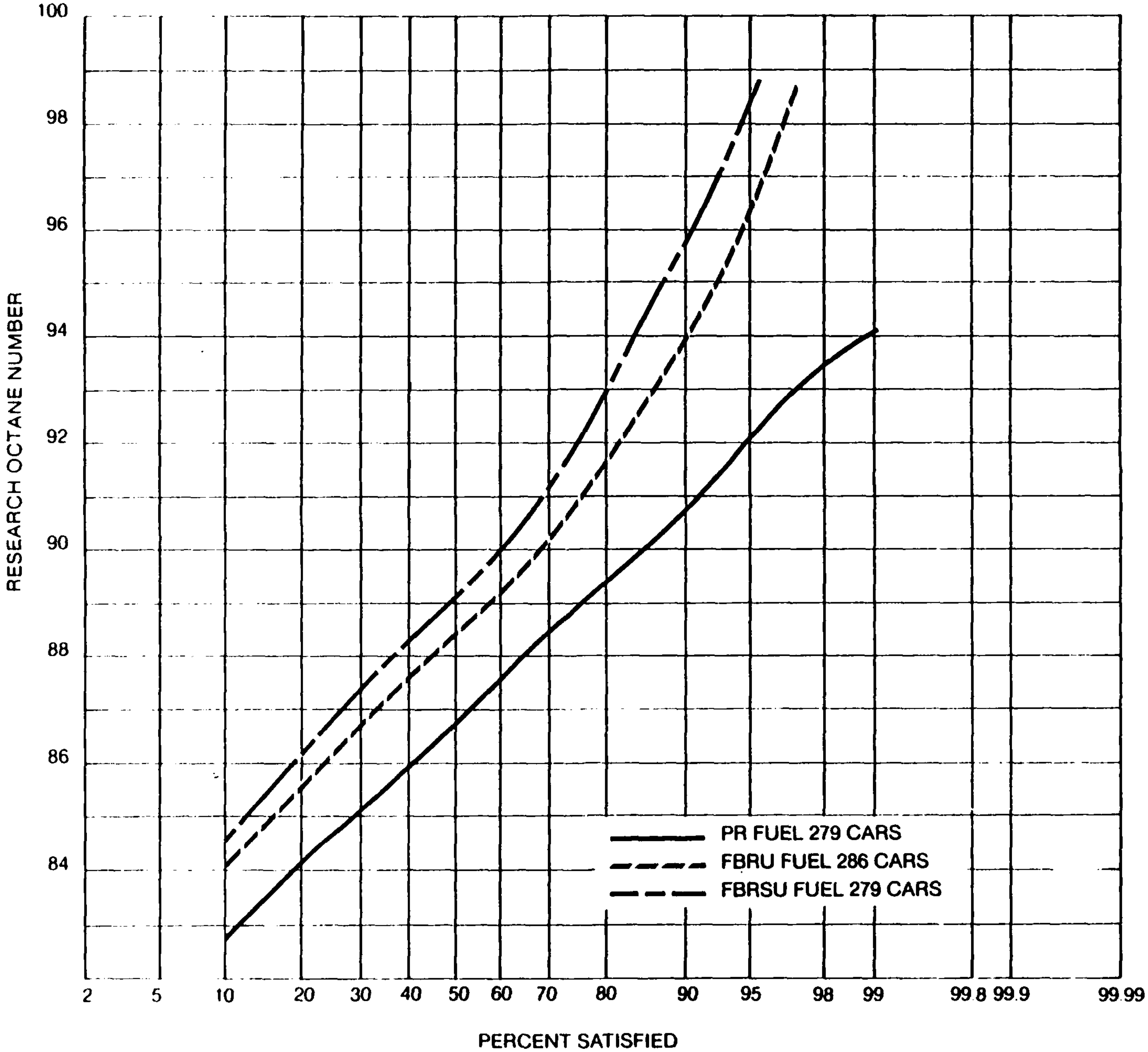


Figure 15a

DISTRIBUTION OF MAXIMUM RON REQUIREMENTS
1983 IMPORTED VEHICLES

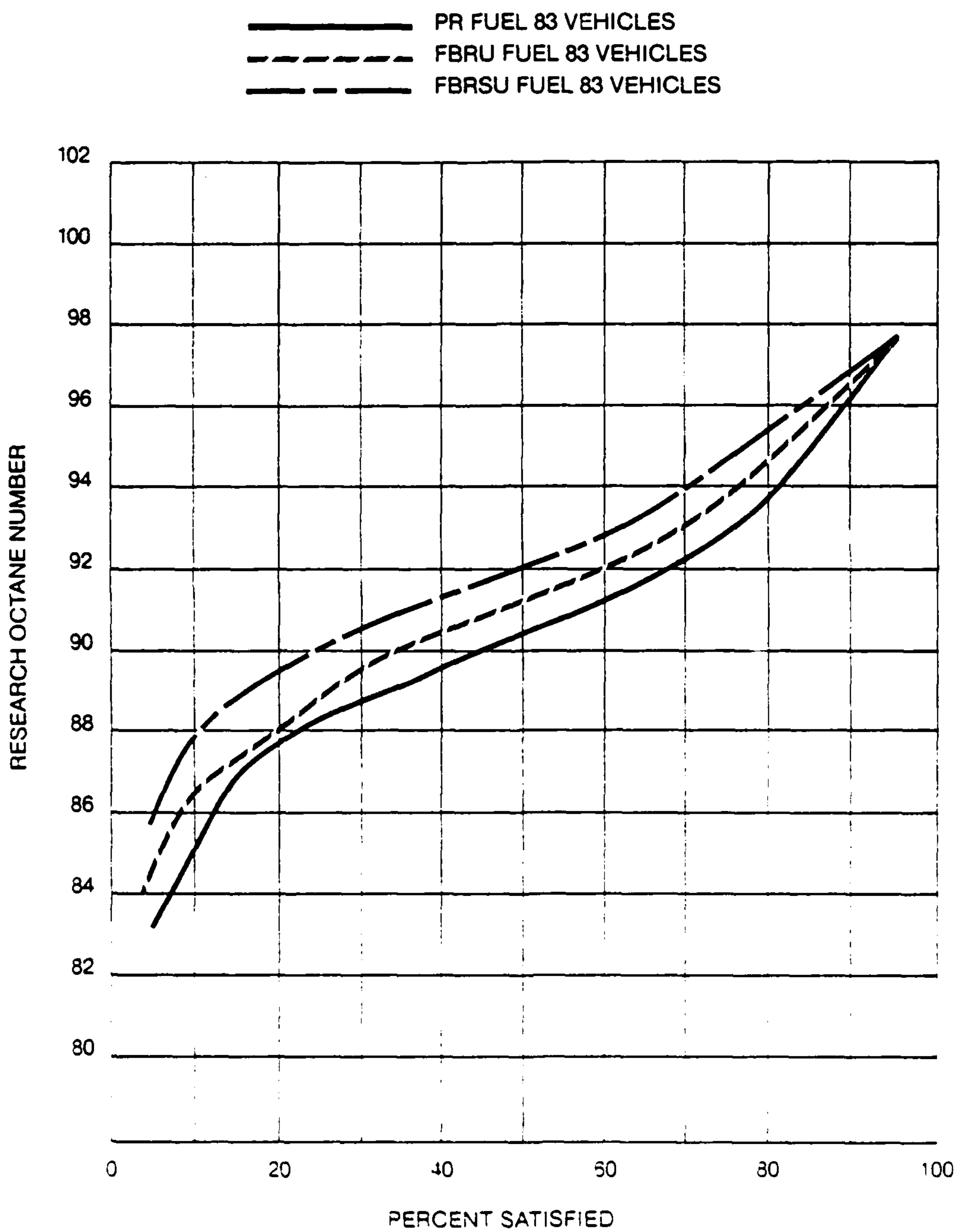


Figure 15b

DISTRIBUTION OF MAXIMUM RON REQUIREMENTS
1983 IMPORTED VEHICLES

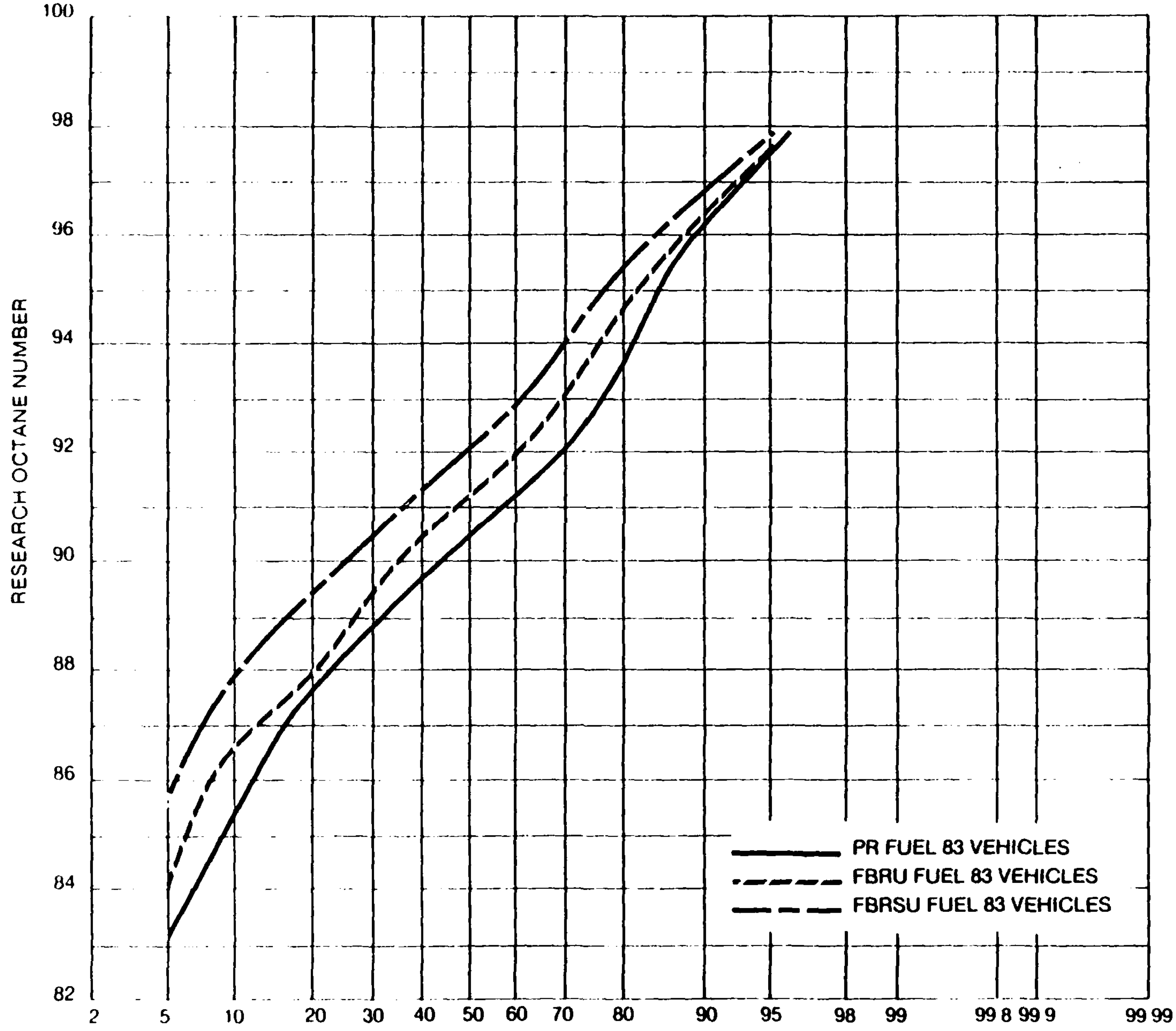


Figure 16

DISTRIBUTION OF RESEARCH OCTANE NUMBER REQUIREMENTS
1983 MODEL NGA 238A3/HGA 238A3/IGA 238A3/LGA 238A3 (18 CARS)

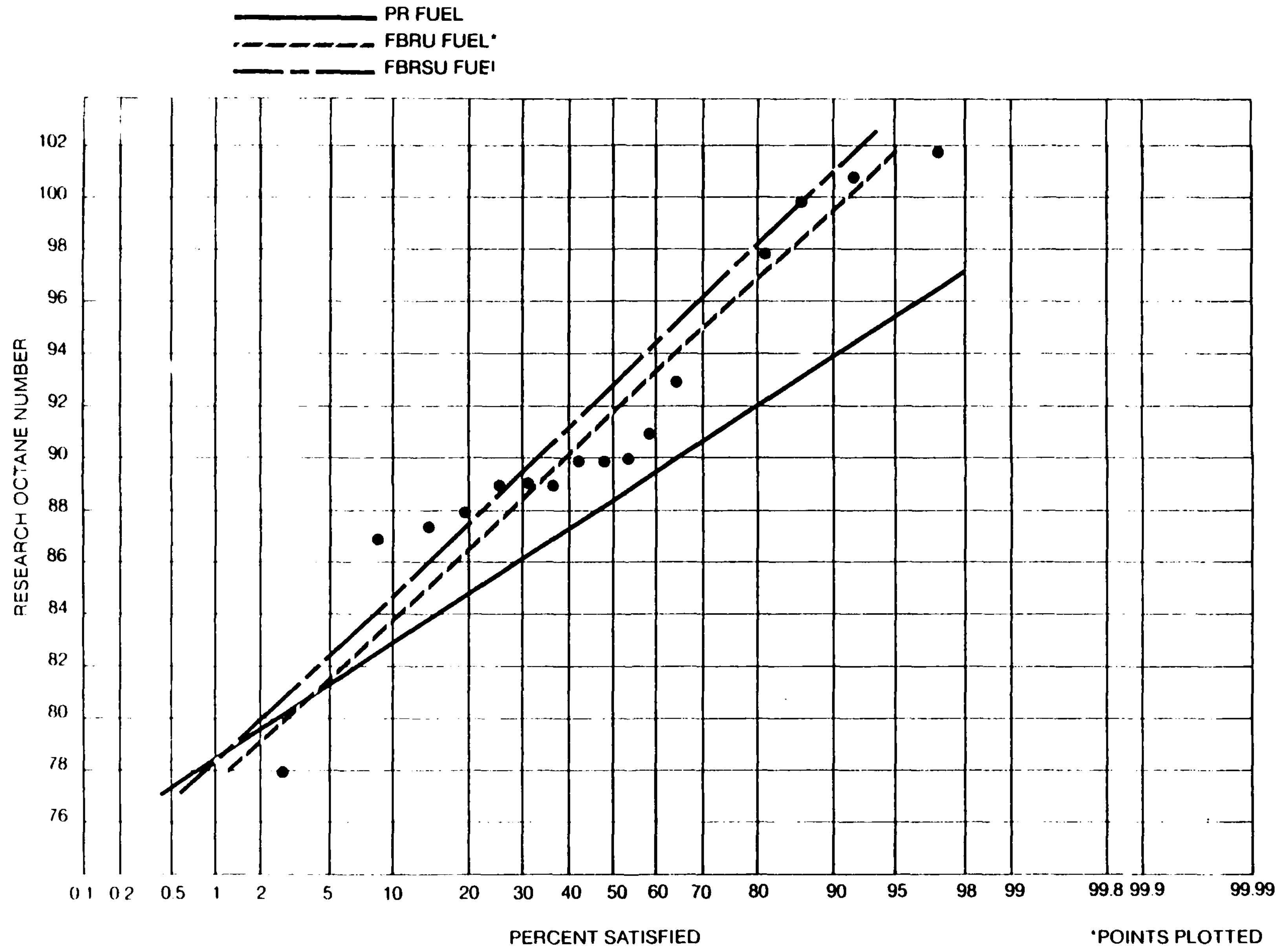


Figure 17

DISTRIBUTION OF RESEARCH OCTANE NUMBER REQUIREMENTS
1983 MODEL NJP F20A3/LJP F20A3/GJP F20A3 (22 CARS)

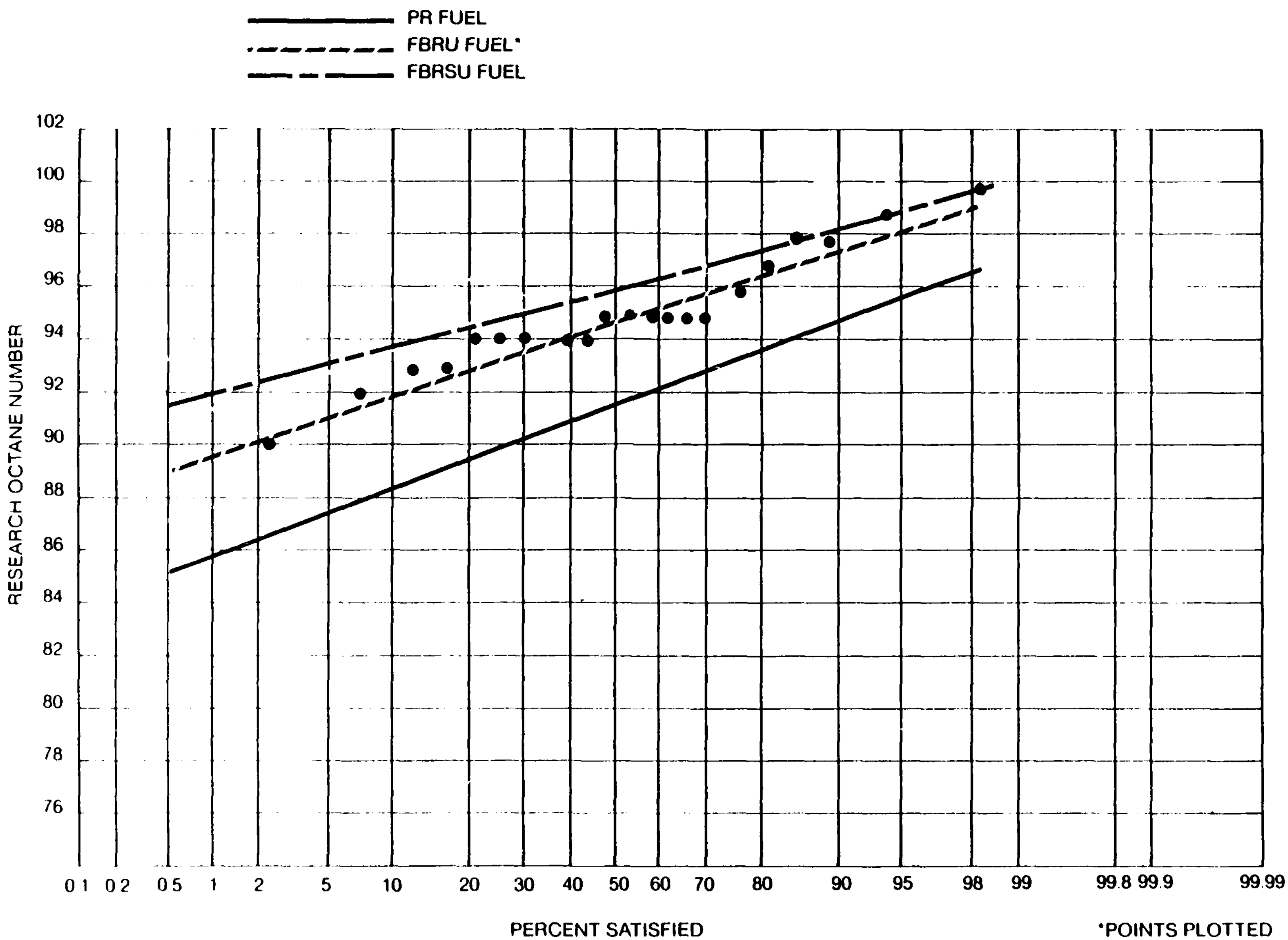


Figure 18

DISTRIBUTION OF RESEARCH OCTANE NUMBER REQUIREMENTS
1983 MODEL OA4 216A3/MA4 216 A3 (16 CARS)

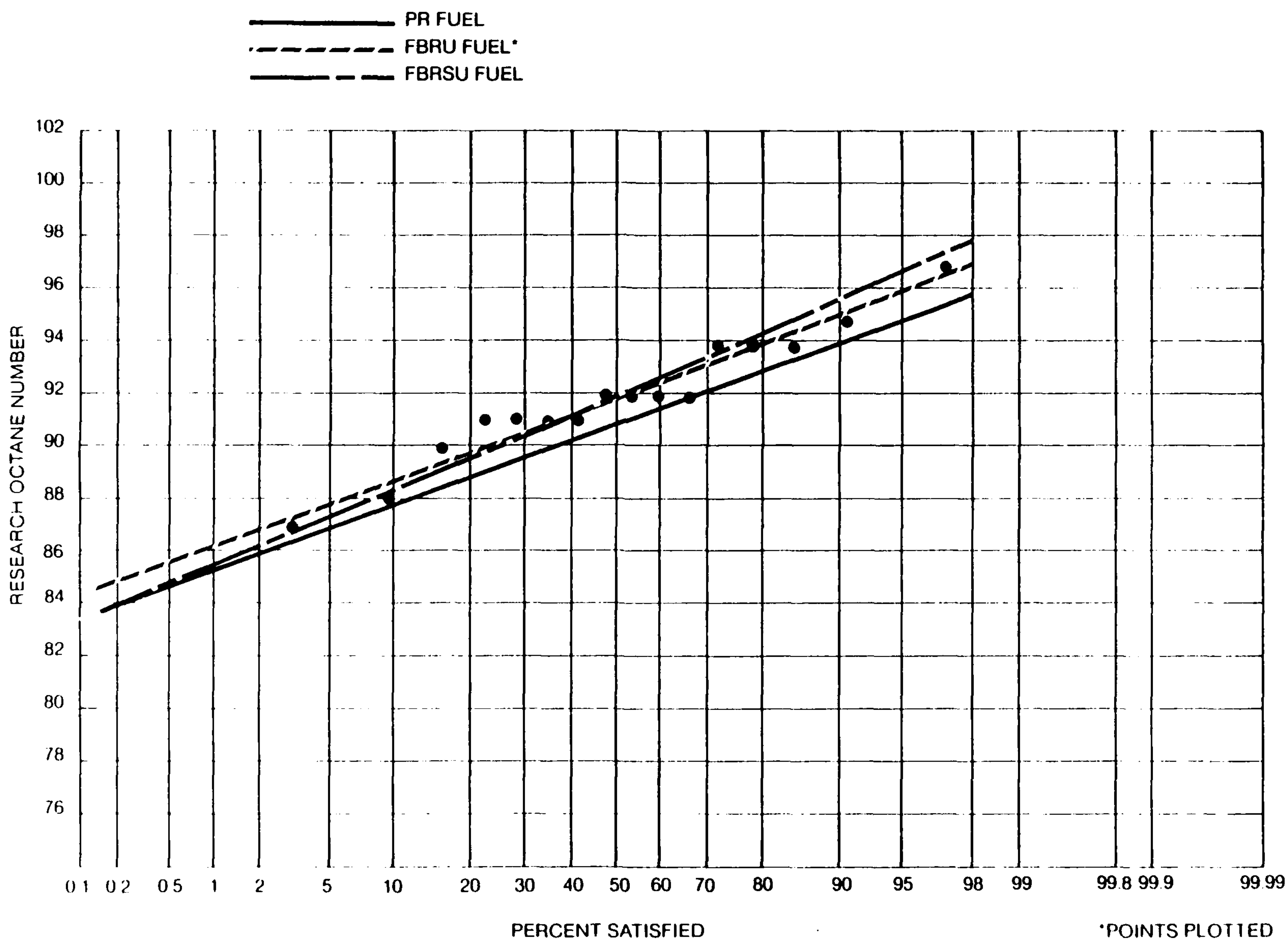
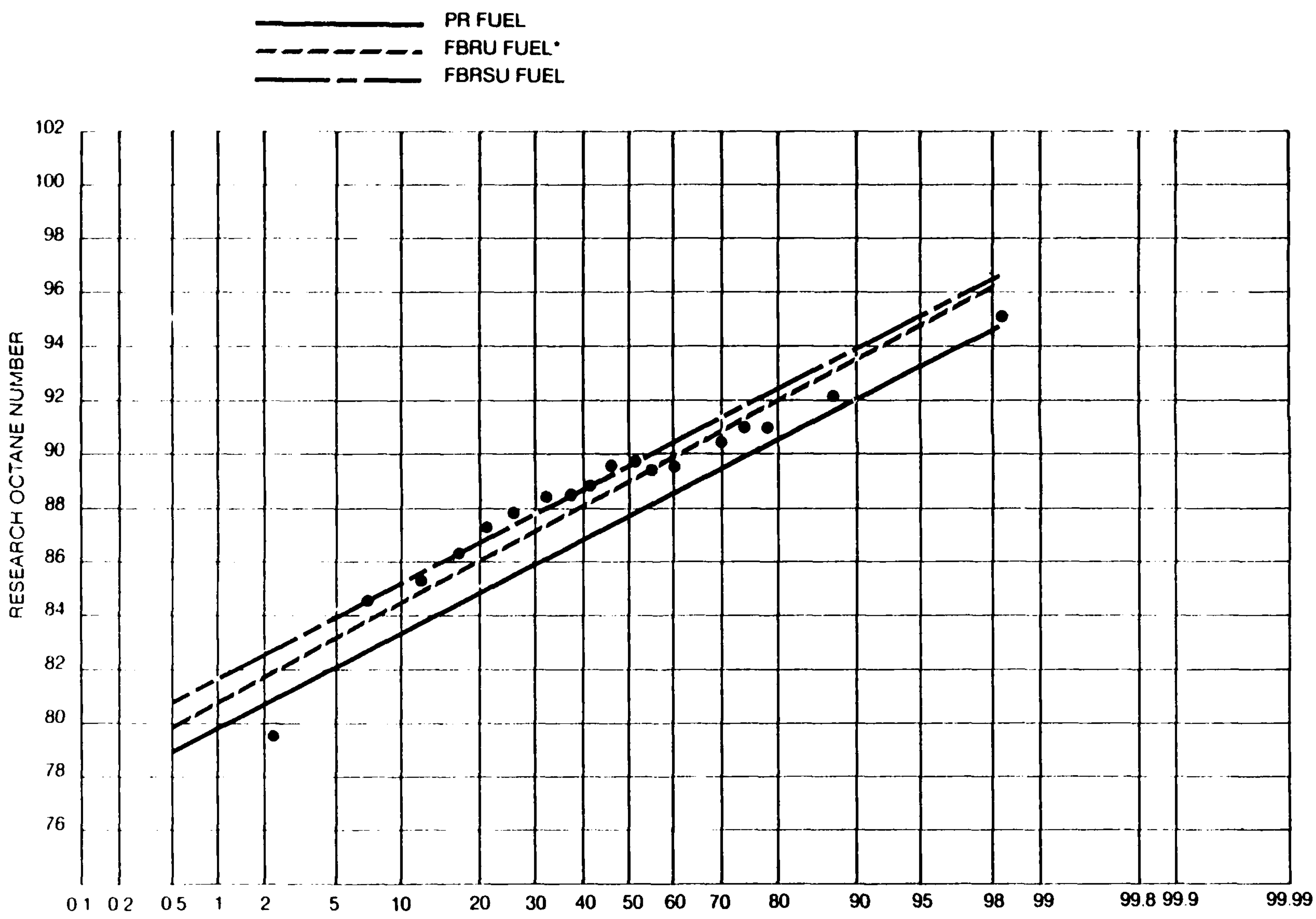


Figure 19

DISTRIBUTION OF RESEARCH OCTANE NUMBER REQUIREMENTS
1983 MODEL OD3 238A3/OD3 238A4/MD3 238A3/OE3 238A3/OE3 238A4/ME3 238A4/(21 CARS)



*POINTS PLOTTED

Figure 20

DISTRIBUTION OF RESEARCH OCTANE NUMBER REQUIREMENTS
1983 MODEL PKC 222A3/KKC 222A3/DKC 222A3/KEC 222A3/DEC 222 A3
(21 CARS FBRU; 20 CARS PR AND FBRSU)

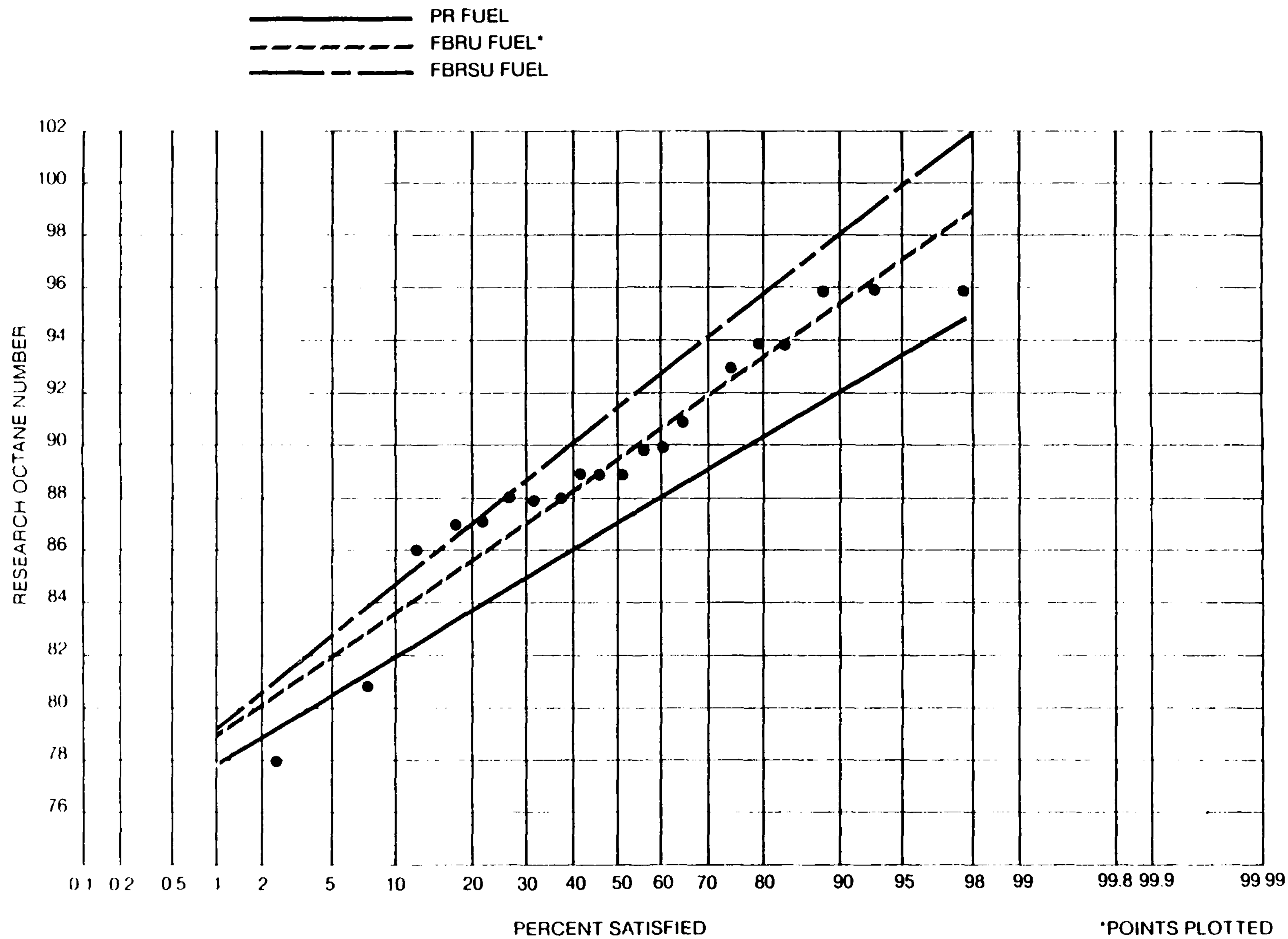
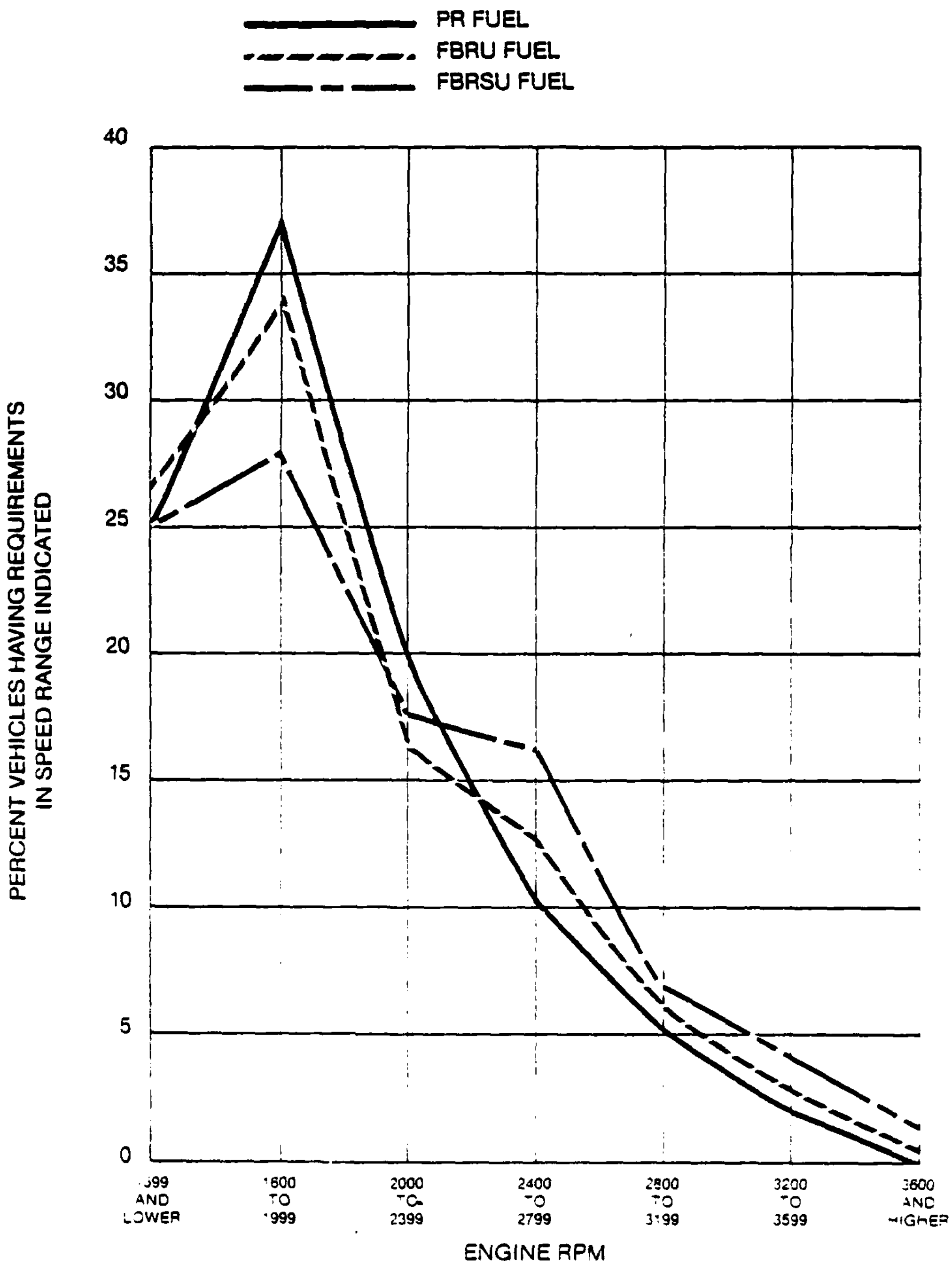


Figure 21

ENGINE SPEEDS FOR MAXIMUM OCTANE NUMBER REQUIREMENTS
ALL 1983 VEHICLES



APPENDIX A

PARTICIPATING LABORATORIES

PARTICIPATING LABORATORIES

Eastern Area

Exxon Research and Engineering Company
Linden, New Jersey

Gulf Research and Development Company
Pittsburgh, Pennsylvania

Mobil Research and Development Corp.
Paulsboro, New Jersey

Sun Company
Marcus Hook, Pennsylvania

Texaco Inc.
Beacon, New York

Toyota Motor Corporation
Secaucus, New Jersey

East Central Area

Chrysler Corporation
Highland Park, Michigan

Ford Motor Company
Dearborn, Michigan

General Motors Corporation
Warren, Michigan

Shell Canada
Oakville, Ontario

Standard Oil Company (Ohio)
Cleveland, Ohio

Western Area

Chevron Research Company
Richmond, California

West Central Area

Amoco Oil Company
Naperville, Illinois

Phillips Petroleum Company
Bartlesville, Oklahoma

Shell Development Company
Houston, Texas

A P P E N D I X   B

MEMBERSHIP: 1983 ANALYSIS PANEL

1983 CRC OCTANE NUMBER REQUIREMENT SURVEY

1983 ANALYSIS PANEL

D. P. Barnard, Leader	Standard Oil Company (Ohio)
J. L. Borzone	Mobil Research and Development Corp.
R. A. Bouffard	Exxon Research and Engineering Company
J. C. Callison	Amoco Oil Company
E. S. Corner	Consultant
R. E. Dizak	Gulf Research and Development Company
M. J. Gorham	Union Oil Company
J. C. Ingamells	Chevron Research Company
M. J. Mlotkowski	Mobil Oil Corporation
W. J. Most	Exxon Research and Engineering Company
K. R. Schaper	Consultant
R. A. Wirth	Sun Tech, Inc.

APPENDIX C

DATA ON 1983
FULL-BOILING RANGE REFERENCE FUELS

TABLE C-I

SUPPLIERS' FUEL INSPECTIONS

COMPARISON OF 1982 AND 1983 FBRU FUELS

	Low-Octane Base Blend		Intermediate-Octane Base Blend		High-Octane Base Blend	
	RMFD 344-83	RMFD 338-82	RMFD 345-83	RMFD 339-82	RMFD 346-83	RMFD 340-82
Laboratory Inspection						
Distillation, °F						
IBP	93	97	95	93	95	99
10% Evap.	123	130	123	121	125	134
30% Evap.	159	164	162	167	181	189
50% Evap.	195	196	210	206	235	225
70% Evap.	233	233	257	235	261	245
90% Evap.	297	295	317	313	294	285
End Point	390	374	414	398	385	388
Gravity, °API	66.3	66.6	59.1	62.1	51.1	52.7
RVP, psi	8.5	8.7	8.6	9.0	8.5	8.2
Lead, g/gal.	<0.003	<0.03	<0.003	<0.03	<0.003	<0.03
Oxidation Stabilitiy, hr.	>24	>24	>24	>24	>24	>24
Hydrocarbon Type, Vol. %						
Aromatics	20.0	20.7	37.0	12.8	57.0	55.5
Olefins	2.0	0.5	3.0	6.3	1.0	3.0
Saturates	78.0	78.8	60.0	80.9	42.0	41.5
Research Octane Number	77.4	76.9	90.6	90.5	102.8	101.5
Motor Octane Number	73.7	72.9	82.9	82.8	91.8	90.3
Sensitivity	3.7	4.0	7.7	7.7	11.0	11.2

TABLE C-II

OCTANE NUMBERS AND COMPOSITIONS FOR 1983 FBRU FUELS

	Blending Data Composition, Volume Percent				
RON	RMFD 344-83	RMFD 345-83	RMFD 346-83	MON	SEN
78	96	4	--	74.2	3.8
80	82	18	--	75.8	4.2
82	67	33	--	77.4	4.6
84	52	48	--	78.9	5.1
85	44	56	--	79.6	5.[illegible]
86	36	64	--	80.3	5.7
87	29	71	--	80.9	6.1
88	21	79	--	81.6	6.4
89	13	87	--	82.2	6.8
90	5	95	--	82.8	7.2
91	--	97	3	83.5	7.5
92	--	90	10	84.1	7.9
93	--	83	17	84.7	8.3
94	--	76	24	85.4	8.6
95	--	69	31	86.0	9.0
96	--	61	39	86.7	9.3
97	--	53	47	87.3	9.7
98	--	44	56	88.0	10.0
99	--	35	65	88.0	10.2
100	--	27	73	89.5	10.5
101	--	19	81	90.3	10.7
102	--	9	91	91.2	10.8

TABLE C-III

SENSITIVITIES OF 1982 AND 1983 FBRU AND FBRSU FUELS

Research Octane No.	FBRU 1983	FBRU 1982	FBRU Δ	FBRSU 1983	FBRSU 1982	FBRSU Δ
78	3.8	4.0	-0.2	6.3	6.2	0.1
80	4.2	4.2	0.0	6.8	6.8	0.0
82	4.6	4.4	0.2	7.0	7.3	-0.3
84	5.1	4.8	0.3	7.6	7.8	-0.2
85	5.4	5.1	0.3	7.9	8.1	-0.2
86	5.7	5.5	0.2	8.2	8.3	-0.1
87	6.1	5.9	0.2	8.5	8.6	-0.1
88	6.4	6.3	0.1	8.7	8.9	-0.2
89	6.8	6.8	0.0	9.0	9.1	-0.1
90	7.2	7.2	0.0	9.3	9.2	0.1
91	7.5	7.7	-0.2	9.7	9.6	0.1
92	7.9	8.3	-0.4	10.1	9.9	0.2
93	8.3	8.8	-0.5	10.5	10.3	0.2
94	8.6	9.0	-0.4	10.9	10.7	0.2
95	9.0	9.3	-0.3	11.2	11.1	0.1
96	9.3	9.6	-0.3	11.5	11.4	0.1
97	9.7	9.9	-0.2	11.8	11.7	0.1
98	10.0	10.2	-0.2	12.1	12.0	0.1
99	10.2	10.5	-0.3	12.4	12.2	0.2
100	10.5	10.7	-0.2	12.7	12.4	0.3
101	10.7	10.8	-0.1	12.9	12.7	0.2
102	10.8	--	--	13.1	--	--

TABLE C-IV

SUPPLIERS' FUEL INSPECTIONS

COMPARISON OF 1983 AND 1982 FBRSU FUELS

	Low-Octane Base Blend		Intermediate-Octane Base Blend		High-Octane Base Blend	
	RMFD 347-83	RMFD 341-82	RMFD 348-83	RMFD 342-82	RMFD 349-83	RMFD 343-82
Laboratory Inspection						
Distillation, °F						
IBP	93	103	97	97	97	93
10% Evap.	126	133	124	134	136	127
30% Evap.	174	163	167	178	186	177
50% Evap.	217	200	217	218	215	245
70% Evap.	263	244	269	261	268	280
90% Evap.	345	363	331	332	325	334
End Point	420	425	415	412	425	398
Gravity, °API	62.9	63.6	57.8	56.0	45.8	49.6
RVP, psi	8.1	7.6	8.8	8.4	8.8	7.9
Lead, g/gal.	<0.003	<0.03	<0.003	<0.03	<0.003	<0.03
Oxidation Stabilitiy, hr.	>24	>24	>24	>24	>24	>24
Hydrocarbon Type, Vol. %						
Aromatics	18.0	15.8	39.0	31.6	62.0	52.5
Olefins	27.0	31.5	5.0	11.9	2.0	3.5
Saturates	55.0	52.7	56.0	56.5	36.0	44.0
Research Octane Number	76.2	77.5	90.2	90.1	102.2	101.5
Motor Octane Number	70.4	71.5	80.5	80.5	89.1	88.3
Sensitivity	5.8	6.0	9.9	9.5	13.1	13.2

TABLE C-V

OCTANE NUMBERS AND COMPOSITIONS FOR 1983 FBRSU FUELS

RON	Blending Data Composition, Volume Percent RMFD 347-83	RMFD 348-83	RMFD 349-83	MON	SEN
78	89	11	--	71.7	6.3
80	75	25	--	73.2	6.8
82	59	41	--	75.0	7.0
84	45	55	--	76.4	7.6
85	38	62	--	77.1	7.9
86	31	69	--	77.8	8.2
87	24	76	--	78.5	8.5
88	16	84	--	79.3	8.7
89	9	91	--	80.0	9.0
90	2	98	--	80.7	9.3
91	--	95	5	81.3	9.7
92	--	88	12	81.9	10.1
93	--	81	19	82.5	10.5
94	--	74	26	83.1	10.9
95	--	66	34	83.8	11.2
96	--	58	42	84.5	11.5
97	--	49	51	85.2	11.8
98	--	41	59	85.9	12.1
99	--	31	69	86.6	12.4
100	--	22	78	87.3	12.7
101	--	12	88	88.1	12.9
102	--	3	97	88.9	13.1

A P P E N D I X   D

PROGRAM

APPENDIX D

COORDINATING RESEARCH COUNCIL
INCORPORATED
219 PERIMETER CENTER PARKWAY
ATLANTA, GEORGIA 30346
(404) 396-3400

PROGRAM

for the

1983 CRC OCTANE NUMBER REQUIREMENT SURVEY

CRC Project No. CM-123-83

June 1983

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I. INTRODUCTION

The 1983 program of the CRC Light-Duty Octane Number Requirement Survey Group will consist of a survey of the octane number requirements of 1983 model domestic and imported vehicles. For the purposes of this program, the designation "passenger vehicles" will include passenger cars, light-duty (<8500 lb/3856 kg GVW) pickup trucks, and vans. Approximately 450 vehicles will be tested. Most of these vehicles will be sampled in proportion to their relative production or import volume, to provide data from which to estimate the distribution of octane number requirements for the 1983 model vehicle population in the United States. In addition, select models of special interest will be tested in sufficient numbers to estimate their requirement distributions.

Knocking characteristics will be investigated with three series of reference fuels. Tank fuel knock will also be evaluated. Maximum octane number requirements, whether at maximum-throttle or part-throttle, will be established for each vehicle using high sensitivity unleaded full-boiling range reference (FBRSU) fuels, average sensitivity unleaded full-boiling range reference (FBRU) fuels, and primary reference (PR) fuels. If the maximum requirement is at maximum-throttle, then part-throttle requirements are investigated with only FBRU fuels of up to, and including, four octane numbers lower than the maximum requirement.

Octane requirements throughout the speed range will be obtained with PR fuels only.

II. GEOGRAPHICAL AREAS

As in previous years, the 1983 Survey will be conducted on a nationwide basis. The country has been divided into four geographical areas. Participants located in New York, New Jersey, Delaware, and Pennsylvania have been included in the Eastern Area; those located in Ohio, Michigan, and Kentucky comprise the East Central Area; those in Illinois, Texas, and Oklahoma comprise the West Central Area; and California participants make up the Western Area. A coordinator has been appointed for each area as follows:

Eastern Area......................W. J. Most
East Central Area..................D. P. Barnard
West Central Area..................J. B. Baker
Western Area......................T. Wusz

The area coordinators will contact their area participants periodically regarding the progress of the survey. To expedite this, it is suggested that participants send copies of all correspondence concerning the survey to the area coordinators. This program outlines the survey in broad terms. If more detailed information is desired, it is suggested that the participant contact his area coordinator.

III. VEHICLES

A total of approximately 450 vehicles will be tested in the 1983 Survey. By requesting each participating laboratory to test approximately 25 vehicles and assuming 18 participants, the 450-vehicle total is obtained. These will be divided into two groups: (1) the statistical group, sampled in proportion to US car model production or import volume, and (2) select models of special interest. Approximately 20 of each of these select models will be tested to provide an estimate of the octane requirement distribution of each model. Some of these 20 vehicles will be those already included in the statistical group, and the remainder will be additional vehicles added to the program.

The desired number of vehicles to be tested in each category is as follows:

Statistical Group	400
Additional Select Model Group	50
Total	450

A detailed breakdown of the specific models and the number of each model to be tested will be circulated to the participants in May 1983 after an estimate of vehicle model production has been obtained. Design specifications for select models to be tested in the 1983 Survey are shown in Table D-1. Selection of these vehicles has been based on new or modified design characteristics that might have a significant effect on octane number requirements and high sales volume which allows individual treatment without additional testing.

Wherever possible, specific vehicle assignments to individual participating laboratories will be made in a pattern which tends to minimize data bias. This will be accomplished by apportioning cars of a given model among the four geographical areas, and subsequently among the laboratories within each area, in order to minimize the effect of non-random factors on the results of the Survey.

IV. FUELS

A. Full-Boiling Range Reference Fuels

Two full-boiling range reference fuel series will be used to define the vehicle octane number requirements. The two series will be unleaded and of varying sensitivity. One series will be comparable to the average sensitivity of unleaded commercial fuels (FBRU); the other series (FBRSU) will be about two numbers higher in sensitivity than the FBRU fuels. The Research octane number (RON) range for both fuel series is 77 to 102.

The two series will be blended in increments of two RON up to 84, and one RON above 84 from three base fuels for each series. The base fuels are compounded from normal refinery gasoline components. Limiting specifications for each base fuel for both series are shown in Table D-II.

Research and Motor ratings will be determined for incremental blends of each fuel series by all participants to provide data for establishment of blending curves. The average ratings and blending curves will be circulated to all participants.

B. Primary Reference Fuels

Blends of ASTM-grade isooctane and normal heptane will be prepared in two octane number increments from 76 to 82, and one octane number increments from 82 to 100.

C. Tank Gasoline

Research and Motor octane ratings will be obtained only on gasoline samples from the tank of vehicles with owner questionnaire (Attachment 1). Owner's Questionnaire should be deleted when:

- the vehicle does not have a regular driver;
- the ignition timing had to be reset more than two degrees.

V. TEST TECHNIQUE

All tests are to be conducted using the technique entitled, "Technique for Determination of Octane Number Requirements of Light-Duty Vehicles" (CRC Designation E-15-83). A copy of this technique is included as Attachment 2 to this program. Octane number requirement investigations are to be conducted in all vehicles under level road conditions. Any vehicle obviously in poor mechanical condition or with malfunctioning emission control devices should not be considered for test work. The vehicles must have a minimum of 6000 deposit miles (9656 km), and preferably be privately owned and operated. Vehicles previously used for fuel road octane rating must not be employed in this survey.

Data should be reported on each vehicle tested, even though knock was not encountered on any of the fuels.

The order in which the fuels are to be tested is as follows:

1) Tank fuel; 2) FBRSU; 3) FBRU; 4) PR.

VI. DATA FORMS

The test results on each vehicle will be reported on data forms DFMF-11-1183, DFMF-12-1183, DFMF-19-1183, and DFMF-26-1183. Copies of these forms will be mailed to all participants from the CRC office with instructions for their use. Additional instructions are included in the E-15-83 technique.

VII. REPORTING RESULTS

The data forms for each vehicle tested should be submitted to the Coordinating Research Council, Inc., 219 Perimeter Center Parkway, Atlanta, Georgia 30346, as soon as possible, but not later than October 31, 1983.

TABLE D-I

DESIGN SPECIFICATIONS FOR 1983 SELECT MODELS

Make & Model	Engine Displ. Litres	No. of Cylinders	Carb. Bbls.	Comp. Ratio	BHP	Transmission Type
Reliant/Aries Dodge 600/ Chrysler E.S.	2.2	4	2	9.0	94	Automatic
Escort/Lynx EXP/LN7	1.6HO	4	2	9.0	80	Automatic
LTD/Marquis T-Bird/XR7	3.8	6	2	8.65	112	Automatic
Malibu/Regal Cutlass/Bonneville Grand Prix/Monte Carlo	3.8*	6	2	8.0	110	Automatic
Skyhawk/Cimarron J-2000/Cavalier	2.0	4	TBI	9.0	90	Automatic

* Engine manufactured by Buick Division, equipped with knock sensor.

TABLE D-II

LIMITING SPECIFICATIONS FOR 1983 FULL-BOILING RANGE REFERENCE FUELS*

Inspection Tests	Unleaded Average Sensitivity Reference Fuels (FBRU)				Unleaded High Sensitivity Reference Fuels (FBRSU)		
	RMFD 344		RMFD 345	RMFD 346	RMFD 347	RMFD 348	RMFD 349
ASTM Distillation, °F(°C)							
IBP, Min.	90	(32.2)	90	90	90	90	90
10% Evap.	115-158	(46.1- 70.0)	115-158	115-158	115-158	115-158	115-158
30% Evap.	150-190	(65.6- 87.8)	150-190	150-190	150-190	150-190	150-190
50% Evap.	195-250	(90.6-121.1)	195-250	195-250	195-250	195-250	195-250
70% Evap.	230-300	(110.0-148.9)	230-300	230-300	230-300	230-300	230-300
90% Evap.	285-374	(140.6-190.0)	285-374	285-374	285-374	285-374	285-374
End Point, Max.	437	(225)	437	437	437	437	437
RVP, psi (KPa)	7-9	(48-62)	7-9	7-9	7-9	7-9	7-9
Lead, g/gal (g/l)	<0.03	(<0.008)	<0.03	<0.03	<0.03	<0.03	<0.03
Oxidation Stability, Minutes, Min.	1440		1440	1440	1440	1440	1440
Hydrocarbon Type, Vol. %							
Aromatics, Max.**	20		35	55	35	45	65
Olefins, Max.	20		15	10	35	25	15
Saturates	Remainder		Remainder	Remainder	Remainder	Remainder	Remainder
Octane Number							
Research	77 ± 1		90 ± 1	102 ± 1	77 ± 1	90 ± 1	102 ± 1
Sensitivity***	4.0 ± .5		7.7 ± .5	11.0 ± .5	6.0 ± .5	9.7 ± .5	13.0 ± .5
Color	Clear		Green	Red	Yellow	Deep Purple	Light Blue

Note: All fuels to contain minimum 5 PTB of a 100% active antioxidant and 5 PTB of corrosion inhibitor. No manganese added.

Minimum of two units sensitivity difference between corresponding fuels of each series.

* To be compounded from normal refinery components. Oxygenates are not to be used as fuel components.
** 1% maximum Benzene or legal.
*** Sensitivities are shown for the mean Research octane number.

CRC OCTANE NUMBER REQUIREMENT SURVEY

OWNER'S QUESTIONNAIRE

OWNER:

Your vehicle is being tested for fuel octane number requirements by a Coordinating Research Council activity. To help analyze the data, we would like the person who has recently been driving the vehicle to answer the following questions:

1. What grade of unleaded fuel do you normally use?

   ☐ Regular ☐ Premium ☐ Mixture

2. Has any engine knock (ping) been encountered with the fuel that is now in the tank?

   ☐ Yes ☐ No

3. Did you consider the knock (ping) objectionable?

   ☐ Yes ☐ No

Vehicle Make ______________________ License No. ____________________

Vehicle Identification No. ____

Attachment 2

TECHNIQUE FOR DETERMINATION
OF OCTANE NUMBER REQUIREMENTS
OF LIGHT-DUTY VEHICLES

(CRC Designation E-15-83)

June 1983

TECHNIQUE FOR DETERMINATION OF OCTANE NUMBER REQUIREMENTS OF LIGHT DUTY VEHICLES

(CRC Designation E-15-83 - Including Annexes A and B)

A. GENERAL

The technique provides for the determination of maximum octane number requirements, whether at maximum-throttle or part-throttle, of a vehicle in terms of borderline spark knock and surface ignition knock on two series of full-boiling range reference fuels as well as on primary reference fuels. If the maximum requirement is at maximum-throttle, then part-throttle requirements are investigated with only FBRU fuels of up to, and including, four octane numbers lower than the maximum requirement. It also provides octane requirements throughout the speed range on primary reference fuels.

Spark knock and surface ignition of tank fuel will also be determined.

B. DEFINITION OF TERMS

1. The following definitions of knock were approved by the CFR and CLR Committees on June 8, 1954, and will be used in this technique. Knock is the noise associated with autoignition* of a portion of the fuel-air mixture ahead of the advancing flame front. The flame front is presupposed to be moving at normal velocity. With this definition, the source of the normal flame front is immaterial; it may be the result of surface ignition or spark ignition.

   a. Spark Knock: A knock which is recurrent and repeatable in terms of audibility. It is controllable by the spark advance; advancing the spark increases the knock intensity, and retarding the spark reduces the intensity. This definition does not include surface ignition knock.

   b. Surface Ignition Knock: Knock which has been preceded by a surface ignition. It is not controllable by spark advance.** It may or may not be recurrent and repeatable.

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* Autoignition: The spontaneous ignition and the resulting very rapid reaction of a portion or all of the fuel-air mixture. The flame speed is many, many times greater than that which follows normal spark ignition. There is no time reference for autoignition.

** For the purpose of this program, it is not intended that surface ignition knock be identified by manipulation of the spark advance.

2. The following definitions of knock intensity were specifically adopted for use in this technique:

   a. No Knock: This means no spark knock or surface ignition knock.

   b. Borderline Knock: This means spark knock of lowest audible intensity, recurrent surface ignition knock of borderline intensity, or infrequent (three or less) surface ignition knocks regardless of intensity.

   c. Above Borderline Knock: This means greater than borderline spark knock, recurrent surface ignition knock greater than borderline intensity, or frequent (four or more) surface ignition knocks regardless of intensity.

3. Definition of Accelerations

   Accelerations are made at maximum-throttle and part-throttle conditions which are defined below:

   a. Maximum-Throttle: The throttle is depressed and held at either full-throttle or the widest throttle position that does not cause the transmission to downshift (detent) throughout the acceleration in each of the required test gears listed in D.3.d.(1)(a). The detent manifold vacuum obtainable on a given model is determined by the transmission characteristics. For manual transmissions, the throttle is depressed fully throughout the acceleration.

   b. Part-Throttle: The throttle is depressed and regulated throughout the acceleration to maintain a desired, constant critical manifold vacuum in highest gear. Part-throttle will constitute any throttle position above detent vacuum (above full-throttle vacuum for manual transmissions) up to the highest road-load vacuum.

C. VEHICLE PREPARATION

The following vehicle preparation steps should be completed before any octane tests are run. Detailed procedures for each adjustment can be found in the manufacturers' shop manuals.

1. Record vehicle identification number and emission control type, Federal, Altitude, or California. Fill in heading on data sheet DFMF-11-1183. (For knock sensor vehicles, use data sheet DFMF-26-1183.) Ford emission calibration numbers are to be recorded.

2. Inspect all vacuum lines and air pump hoses for appropriate connections. Also, check to see if PCV valve, distributor vacuum delay valve, EGR valve, and heated inlet air mechanism are functioning. Engine must be warmed up for these checks.

3. Record engine idle speed and observe anti-dieseling solenoid operation. Adjust to manufacturers' recommended specifications as specified on the under-hood decal.

4. Observe and record basic spark timing at recommended engine speed. Adjust to manufacturers' recommended setting as specified on the under-hood decal.

5. Crankcase oil, radiator coolant, automatic transmission fluid, and battery fluid levels shall be maintained as recommended by the manufacturer.

6. A calibrated tachometer graduated in 100 rpm (or smaller) increments and capable of indicating engine speed from 0-5000 rpm shall be installed on each vehicle.

7. One calibrated vacuum gage, graduated in one-half inch of mercury (or smaller) increments and capable of indicating vacuum from 0-24 inches of mercury (0-81 KPa) shall be connected to the intake manifold.

8. An auxiliary fuel system shall be provided to supply test fuels to the engine. Caution shall be taken to avoid placing auxiliary fuel lines in locations which promote vapor lock. If vehicles with carbureted engines have tank return fuel lines, this return line should be blocked off. Disconnect fuel tank vent line at evaporation control system canister. Instructions for fuel handling with fuel injection systems are given in Annex A.

9. For vehicles with owner questionnaire completed, a sample of the tank gasoline shall be withdrawn for determination of Research and Motor method octane number ratings.

D. TEST PROCEDURE

1. Engine Warm-Up

a. To stabilize engine temeratures, a minimum of ten miles of warm-up is required. The test vehicle should be operated at 55 mph (88 kph) in top gear with a minimum of full-throttle operation.

b. During the warm-up period, the general mechanical condition of the vehicle should be checked to insure satisfactory and safe operation during test work.

2. Fuel Changeover

Caution: Because of the installation of catalytic devices on these vehicles, permanent damage may result if the engine runs lean or stalls. Therefore, changeover from one fuel to another must be accomplished without running the carburetor or fuel injection system dry. Fuel handling procedures for vehicles equipped with fuel injection systems are explained in Annex A.

To eliminate contamination of the new fuel with residual amounts of the previous fuel, flush system twice with new fuel.

After fuel changeover, make one maximum-throttle acceleration before beginning Vehicle Rating Procedure.

3. Details of Observations

a. Operating Conditions

All octane number requirements will be determined under level road acceleration conditions.

Tests will be conducted on moderately dry days, preferably at ambient temperatures above 60°F (15.5°C). Tests should not be conducted during periods of high humidity such as prevail when rain is threatening or during or immediately after a rain storm. Laboratories with control capabilities should target for 70°F (21°C) air temperature and 50 grains of water per pound (7.14 gm/kg) of dry air whenever possible.

Air-conditioned vehicles will be tested with air conditioner turned ON. (Normal setting, low fan.) Air conditioner will be ON at all times.

b. Order of Fuel Testing

1) Tank

2) FBRSU

3) FBRU

4) Primary

c. Determination of Knock Intensity

Octane requirements will be established by evaluating the occurrence of knock in terms of knock intensity: "N" for none, "B" for borderline, and "A" for above borderline. Establishment of representative knock intensity for a given fuel will be accomplished with the fewest number of accelerations possible. As defined below, the first two duplicating accelerations are sufficient with "N" and "B" intensity.

Number of Accelerations			Representative Rating
1	2	3	
N	N	-	N
N	B	N	N
N	B	B	B
B	N	B	B
B	B	-	B
B	A	-	A
A	-	-	A

All subsequent accelerations will normally be discontinued when "A" knock intensity is experienced, and testing continued with a higher octane number fuel in that series. An exception will be made if "A" knock is experienced on the highest octane fuel which knocks in the engine. In this case, it may be necessary to run additional accelerations to determine the speed of maximum knock intensity. If "A" knock is experienced at initiation of acceleration, as limited by transmission characteristics, this speed will be considered the speed of maximum knock. Otherwise, the midpoint between knock-in and knock-out will be considered the speed of maximum knock. When establishing knock-in and knock-out, back off on the throttle between points to eliminate "A" knock. Tip-in knock and knock at shift points should be ignored.

d. Determination of Octane Requirements

Tests should be run to 60 mph (97 kph) unless required to terminate at 55 mph (88 kph) because of legal speed limits.

The procedure for knock sensor-equipped cars is shown in Annex B.

(1) Vehicle Operating Procedure

(a) Establishment of Automatic Transmission Characteristics (for Maximum-Throttle Accelerations)

Obtain the transmission downshift characteristics of engine rpm and manifold vacuum at 25, 35, 45, and 55 mph (40, 56, 72, and 88 kph) incremental speeds (as obtainable in each gear), by movement of the throttle through the detent, i.e., downshift, throttle position. Also determine the minimum attainable road speed. These characteristics are to be determined for each of the gears specified in the table below. For transmissions with converter clutches, determine the minimum road speed for clutch application. At this initial speed and at 10 mph (16 kph), increments up to about 60 mph (97 kph) determine minimum vacuums for application. Record all road speed/engine rpm/vacuum measurements from above on data sheet.

The vehicle brakes may be applied lightly, if necessary, to maintain vehicle speed, except when converter clutch engagement is desired, in vehicles so equipped.

The selection of required test gears, and test gear/converter clutch combinations (if applicable) for various types of transmissions are listed below. Transmissions not explicitly described should be tested in a manner as similar as possible to those listed. Automatic transmission vehicles should be tested with the gear selector in D or O.

TRANSMISSION GEAR SELECTION

AUTOMATICS

Place the selector in "D" or "O" and check for critical condition.

Type	Gears to be Tested
GM 4-speed	4th gear, converter clutch engaged
	3rd gear, converter clutch disengaged
	2nd gear, converter clutch disengaged

Type	Gears to be Tested
GM 3-speed	3rd gear, converter clutch engaged 3rd gear, converter clutch disengaged 2nd gear, converter clutch disengaged
Ford 4-speed overdrive	4th gear 3rd gear 2nd gear
Other 3-speed	3rd gear 2nd gear
MANUALS	
5-speed	4th and 3rd gears
4-speed	4th and 3rd gears
3-speed	3rd and 2nd gears

(b) Maximum-Throttle Requirements - Automatic Transmissions

For maximum-throttle accelerations in each of the gears and gear/converter clutch combinations specified above, accelerate at the detent/application condition according to the speed versus vacuum profiles determined in (a) from the minimum obtainable speed up to 60 mph (97 kph). If the transmission downshifts, abort and start the acceleration again. Start with the highest gear or gear/clutch combination and proceed in descending order.

(c) Maximum-Throttle Requirements - Manual Transmissions

Select the highest gear as specified in the table above. Start at the lowest speed from which the vehicle will accelerate smoothly or 30 mph (48 kph), whichever is higher, and depress the throttle full throughout the acceleration up to 60 mph (97 kph).

Select the next lower gear specified in the table above and accelerate at full throttle from the minimum speed from which the vehicle will accelerate smoothly up to 60 mph (97 kph).

(d) Part-Throttle Requirements (Both Automatic and Manual Transmissions)

Select the highest gear or highest gear/converter clutch combination specified in the table above. To obtain the critical part-throttle vacuum, first operate at road load (constant speed)*, at 25, 35, 45, and 55 mph (40, 56, 72, and 88 kph) incremental speeds (if obtainable in the specified gear). At each speed, move the throttle (in 3 to 5 seconds) from the road-load vacuum to:

1. full-throttle vacuum for manual transmissions;

2. detent vacuum for automatic transmissions without converter clutches;

3. one inch Hg (3.4 kpa) above the minimum vacuum at which the converter clutch disengages for so-equipped automatic transmissions.

The vehicle brakes may be applied lightly, if necessary, to maintain vehicle speed during throttle fanning, except for vehicles with converter clutch transmissions or EGR cut-outs.

If knocking occurs within any of the vacuum ranges, establish the manifold vacuum which gives maximum knock intensity. This is the critical vacuum to be used for all subsequent constant-vacuum part-throttle accelerations from the minimum obtainable speed in the test gear to 60 mph (97 kph), or until the vehicle ceases to accelerate*.

(2) Tank Fuel Observations on Vehicles with Owner's Questionnaire

Investigate for maximum-throttle and part-throttle knock as detailed in Item 3d(1). Define maximum knock intensity as per Item 3c. Record maximum knock intensity, speed of maximum knock intensity, and manifold vacuum at each operating condition.

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* To stabilize vacuum advance in vehicles with vacuum delay devices, operate at road load for 40 seconds before fanning the throttle or starting the acceleration.

(3) <u>Vehicle Rating Procedure (for Rater)</u>

Knock rating should be performed while in a normal seated position (head above instrument panel) with floor mats in place.

Step 1 - Using a fuel estimated to give borderline knock in a given fuel series, investigate for incidence of knock under conditions as described in D.3.d.(1)(b) above, and D.3.d.(1)(c) above, whichever is applicable.

Step 2 - If no knock occurs, go to a lower octane number blend in that series and repeat Step 1.

Step 3 - If knock occurs at one or more of the operating conditions in Step 1, continue investigation at the critical condition(s) with higher octane blends until highest octane fuel giving knock is determined within one octane number or one blend. Record maximum knock intensity on all fuels. Record speed of maximum knock intensity and manifold vacuum on highest octane fuel that knocks.

Step 4 - Using the lowest octane blend that did not knock in Step 3, investigate for incidence of part-throttle knock as described in D.3.d.(1)(d). If knock occurs, continue investigation at critical vacuum until requirement is defined. Record maximum knock intensity and critical manifold vacuum on all fuels, and speed of maximum knock intensity on highest octane fuel that knocks.

Step 5 - With <u>FBRU fuel only</u>, if no knock occurs in Step 4, go to a lower octane number blend and repeat Step 4. Discontinue part-throttle investigation if knock is not observed with a fuel four octane numbers lower than determined in Step 3.

The rating procedure is given in arrow diagram form on page D-24.

(4) Octane Number Requirement Over Speed Range

Octane requirements over the speed range will be obtained on primary reference fuels only using throttle position for maximum requirements. These will be established by recording the knock-in and knock-out points during maximum requirement acceleration with each incremental fuel investigated. It may be necessary to test one or two additional lower octane fuels to describe the knocking characteristics over the speed range. Accelerate at maximum requirement throttle position from minimum obtainable speed as determined in 3d(1)(a), up to 3750 rpm, if necessary, in order to define requirements. These should be run to 60 mph (97 kph) unless required to terminate at 55 mph (88 kph) because of legal speed limits. If 3750 rpm cannot be attained in top gear, accelerations shall be discontinued and resumed in the next highest gear from 500 rpm below the engine speed at which top gear accelerations were determined.

When "A" knock is experienced, continue the acceleration, but back off on the throttle to maintain "B" knock until just prior to the knock-out point.

E. INTERPRETATION OF DATA

The data will be recorded on data sheet DFMF-11-1183 (DFMF-26-1183 for knock sensor-equipped vehicles). Octane requirements for all reference fuels shall be determined as follows:

1. If the knock intensity of the highest fuel giving knock is borderline, the requirement shall be reported as the octane number of that fuel.

2. If the knock intensity of the highest fuel giving knock is above borderline, the requirement shall be reported as one-half the difference between the fuel giving knock and the next highest fuel.

3. If the octane requirement in high gear is equal to the requirement in passing gear, report the highest gear data.

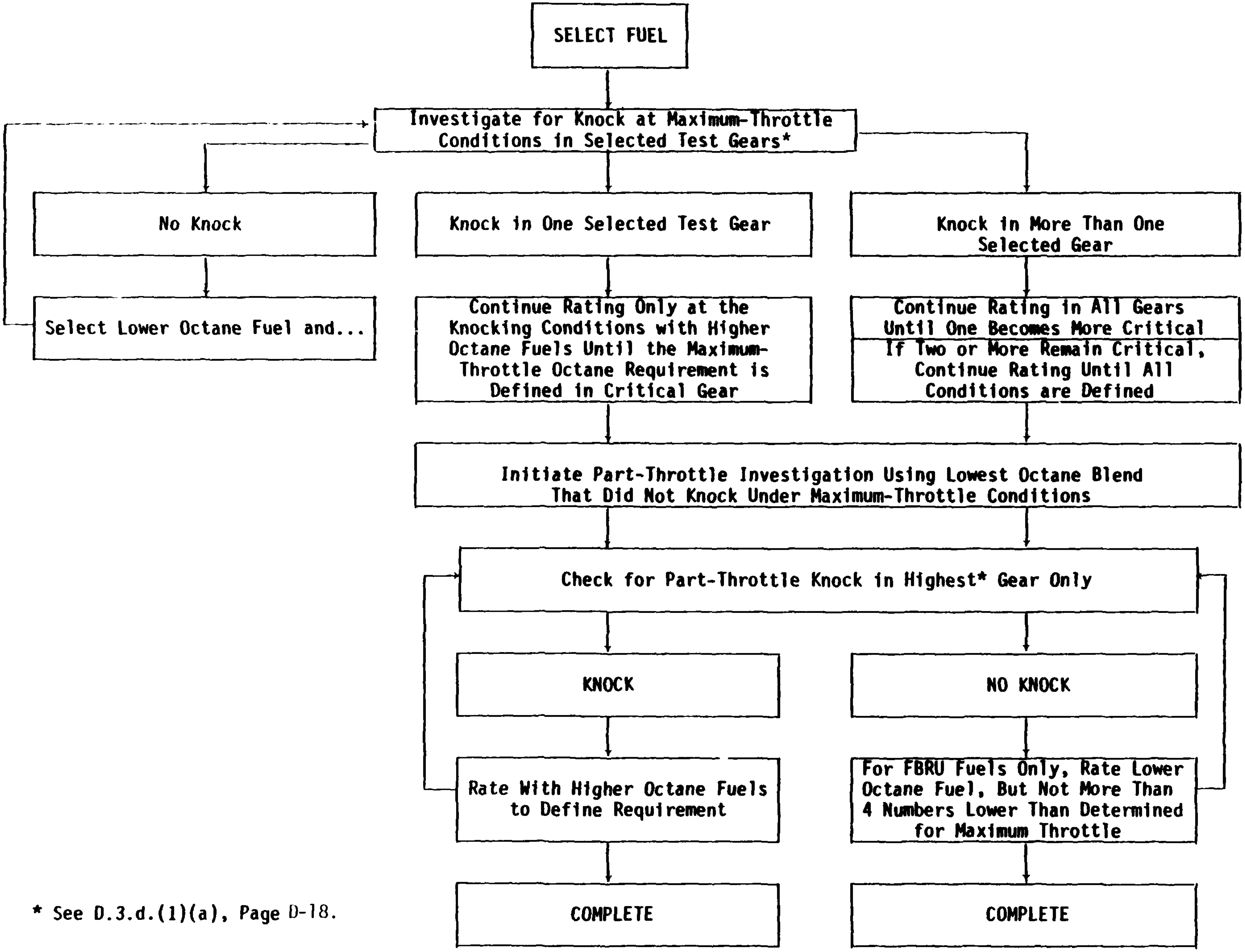
4. For part-throttle requirements, report the data from the highest manifold vacuum observations.

Speed range data shall be reported on data sheet DFMF-11-1183 as the engine speed of knock-in and knock-out for the octane number of the primary reference fuel tested.

Record data on all fuels tested, even though knock was not encountered. When transferring data to the summary block, record the higher requirement, either part-throttle or maximum-throttle condition for all fuels. If the higher requirement is not part-throttle, record the part-throttle FBRU requirement. Use proper letter designation (see footnotes on data sheet) to designate requirements outside of the reference fuel limits or FBRU part-throttle requirement more than four numbers below maximum.

Requirements for the various engine speeds will be determined by fitting a smooth curve through the knock-in and knock-out points on work form DFMF-12-1183. Primary reference fuel requirements at various engine speeds should be reported to the nearest one-half octane number and recorded on the speed range summary block.

It is important that the vehicle identification number (VIN) of each vehicle tested be recorded on all data sheets to provide a means of cross-indexing.



* See D.3.d.(1)(a), Page D-18.

ANNEX A

to the

CRC E-15-83 TECHNIQUE

PROCEDURE FOR SETTING UP VEHICLES

WITH FUEL INJECTION

ANNEX A

TO THE CRC E-15-83 TECHNIQUE

PROCEDURE FOR SETTING UP VEHICLES AND HANDLING REFERENCE FUELS -- VEHICLES EQUIPPED WITH MULTIPLE-PORT FUEL INJECTION

1. To run octane requirements on fuel-injected vehicles it is necessary to run an external fuel line to the inlet of the vehicle fuel injection pump.

2. The fuel return line from the engine to the fuel tank must be disconnected after the fuel pressure regulator (in engine compartment) and before the fuel tank. An auxiliary line long enough to reach the cans must be added to the fuel return line.

3. Make certain that the fuel tank connections are plugged; this means both the normal fuel pump inlet line and the normal fuel return line connection. On vehicles with an in-tank booster pump, this pump must be shut off so it cannot run during the time the vehicle is operating on the external fuel system. If this pump is not disconnected, it will be destroyed.

4. An electric fuel pump (Bendix type acceptable) must be used to draw fuel from the reference fuel can to supply the fuel injection pump on the vehicle. Caution must be exercised to keep the fuel line between the reference fuel cans and the vehicle fuel injection pump full of fuel. If very much air gets into this line, the fuel injection system will become air bound and it is difficult to get the air out of the system.

5. Once the fuel injection pump line and return line have been disconnected, all subsequent operations must be done from an external fuel source.

6. It is possible to use three-way valves in the fuel line between the fuel pump and the fuel tank and between the return line and the fuel tank. When used, the operator must change the return line valve to the auxiliary fuel system while the engine is shut down, to avoid building up excessive pressure in the return line which could damage both the fuel pressure regulator and injection pump.

7. When changing from one reference fuel to another, the following steps must be followed:

   a. Put fuel inlet line in reference fuel tank with the return line going to a slop fuel can. Do not keep fuel inlet line out of the fuel can any longer than is necessary to move it from one can to the next. <u>DO NOT RUN OUT OF FUEL</u>.

b. Observe the fuel stream in the fuel return line. As soon as a steady flow of fuel is observed, move the fuel return line to an empty one-quart can (0.946 ℓ). Allow one quart (0.946 ℓ) of fuel to flow into this can before inserting the return line into the chosen reference fuel can. This operation should take about 60 seconds.

c. When going to the next reference fuel, it will be necessary to repeat Steps a and b.

The fuel injection pumps on most vehicles pump between 30 and 50 gallons (114-189 ℓ/h) of fuel per hour. Therefore, Steps a and b should be folowed very closely or there will be gross reference fuel contamination, or you will use a lot more reference fuel than is required to run each test. If Steps a and b are followed exactly, you will be discarding to slop about two quarts (1.892 ℓ) of reference fuel each time you change reference fuels. The two quarts (1.892 ℓ) to slop will be at least as much fuel as is consumed to obtain the reference fuel rating.

PROCEDURE FOR SETTING UP VEHICLES AND HANDLING REFERENCE FUELS -- VEHICLES EQUIPPED WITH THROTTLE-BODY FUEL INJECTION

The General Motors throttle-body fuel injection system is shown in the attached schematic drawing. The fuel supply system consists of an in-tank electric fuel pump, a full-flow fuel filter mounted on the vehicle frame, a fuel pressure regulator integral with the throttle body, fuel supply and return lines, and two fuel injectors. The injection timing and amount of fuel supplied is controlled by an electronic control module (not shown in figure). To prepare a vehicle with this system for octane requirement testing, an auxiliary electric fuel pump must be installed. The fuel pressure regulator controls fuel pressure at the injectors to a nominal 10.5 psi; therefore, an auxiliary pump capable of at least 10.5 psi outlet pressure must be used for satisfactory engine operation. The following procedure is recommended for preparing a vehicle with throttle-body fuel injection for octane requirement testing and for changing reference fuels during such testing:

1. Disconnect and plug the fuel supply and fuel return lines at the locations shown in the figure. Install an additional line between the fuel supply line and the outlet of the auxiliary pump. Connect the inlet of the auxiliary pump to the reference fuel can. Connect the fuel return line to the reference fuel can through a tee at the auxiliary pump inlet. All auxiliary fuel lines are indicated by dashed lines in the figure.

2. An optional arrangement would be to use three-way selector valves in the fuel supply and fuel return lines at the locations where auxiliary fuel lines are connected. When these valves are used, the operator must change the valves to the external fuel system while the engine is shut off to avoid building up excessive pressure in the fuel return line.

3. Disconnect the in-tank fuel pump so it cannot run during the time the vehicle is operating on the external fuel system. If this pump is not disconnected, it may be destroyed.

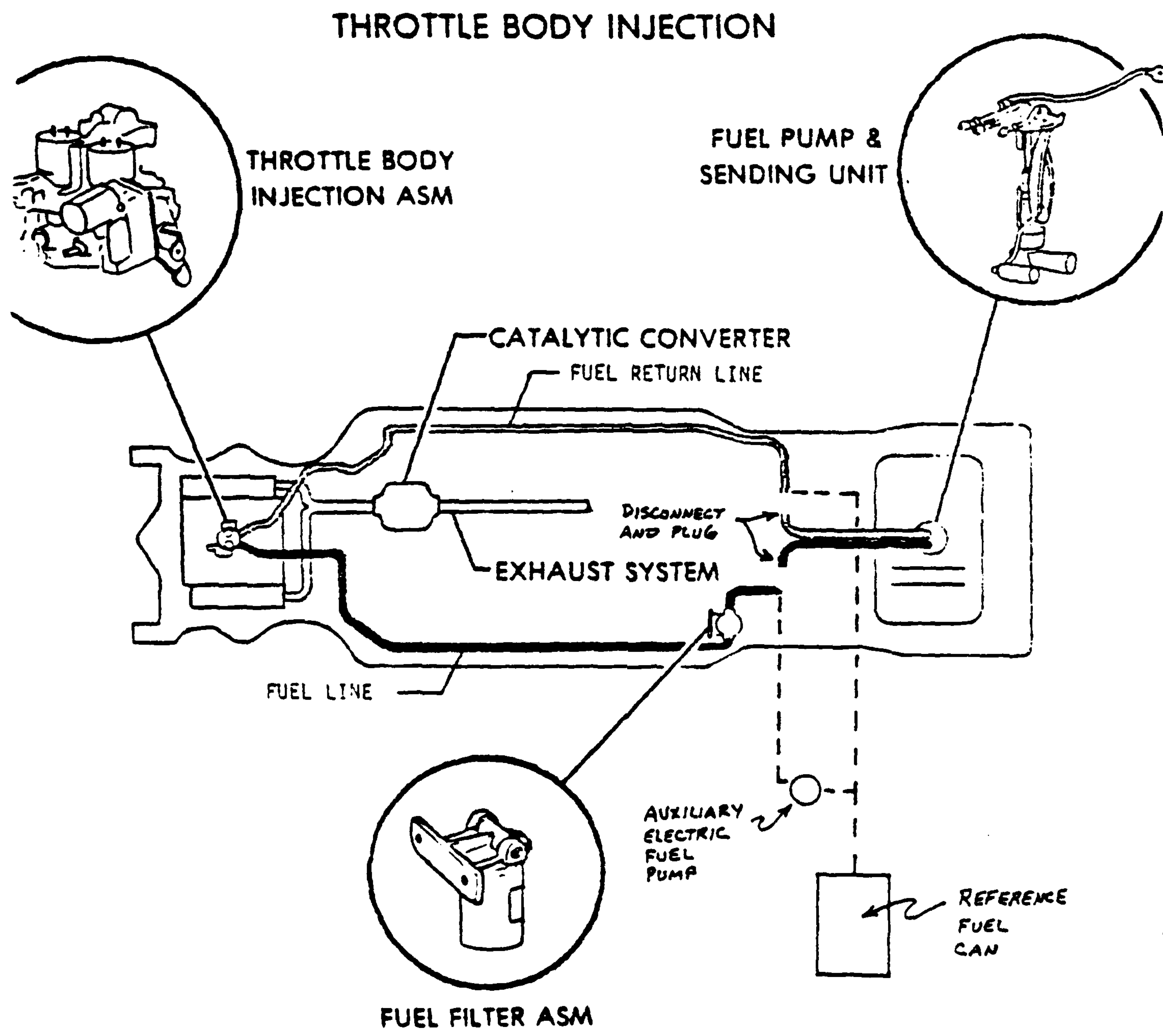
4. When changing from one reference fuel to another, the followign steps should be followed:

   a. Disconenct fuel inlet line from reference fuel can and run engine a short time; <u>do not run out of fuel</u> since this will introduce air into the fuel injection system, and excessive cranking will be required to restart the engine.

   b. Insert fuel inlet line in desired reference fuel can; operate vehicle for two miles at a maximum speed of 55 mph during which time four part-throttle accelerations are made. This must be done to ensure that the vehicle fuel system has been purged and contains the desired reference fuel for octane rating.

   c. When changing to another reference fuel, repeat Steps a and b.

PROCEDURE FOR SETTING UP VEHICLES AND HANDLING REFERENCE FUELS
-- VEHICLES EQUIPPED WITH THROTTLE-BODY FUEL INJECTION - (Continued)



PROCEDURE FOR SETTING UP VEHICLES AND HANDLING REFERENCE FUELS -- FORD VEHICLES EQUIPPED WITH CENTRAL FUEL INJECTION SYSTEM

A vehicle schematic of one of Ford's central fuel injection systems is shown on the following drawing (other systems vary in configuration dependent upon engine/model type - see note 1). This fuel system consists of: an electric in-tank fuel pump, primary and secondary full-flow fuel filters, throttle-body assembly with integral fuel pressure regulator and two fuel injectors, fuel supply and return lines. The following procedure is recommended for preparing the vehicle for octane requirement testing:

1. Relieve pressure in fuel system using valve provided on throttle body. Fuel supply lines will remain pressurized for long periods of time after engine shut down. Disconnect and cap the fuel supply and fuel return lines leading from the fuel tank. Access to connection points may be obtained through either the: rear wheel wells, underbody, or engine compartment, dependent upon vehicle type. Install additional lines to the open supply and return lines and lead these lines back into the vehicle.

2. Connect the added fuel supply line to an auxiliary fuel pump. The fuel pressure regulator in the throttle body controls fuel pressure to a nominal 39.9 psi; therefore, it requires an auxiliary fuel pump capable of providing at least 45 psi outlet pressure (see note 1). The added 5.1 psi is needed to sufficiently overcome the pressure head and line restriction losses. Connect a supply line to the auxiliary pump from the reference fuel can. A fuel filter may be required between the auxiliary pump and reference fuel can to protect the pump. Also, connect the added fuel return line to the fuel reference can and vent the reference can to outside the vehicle.

3. Disconnect the electrical supply to the electric in-tank fuel pump, either by disconnecting the plug on the fuel tank or by disarming the inertia switch located in the trunk. Failure to disarm the in-tank fuel pump may result in a damaged pump. The voltage supplied to the inertia switch may be used as an electrical source for the auxiliary fuel pump. This voltage source is controlled by the on-board computer allowing the auxiliary pump to respond the same as would the in-tank fuel pump. When making this connection, do not "splice" into the wire, instead connect the wire lead to the connector.

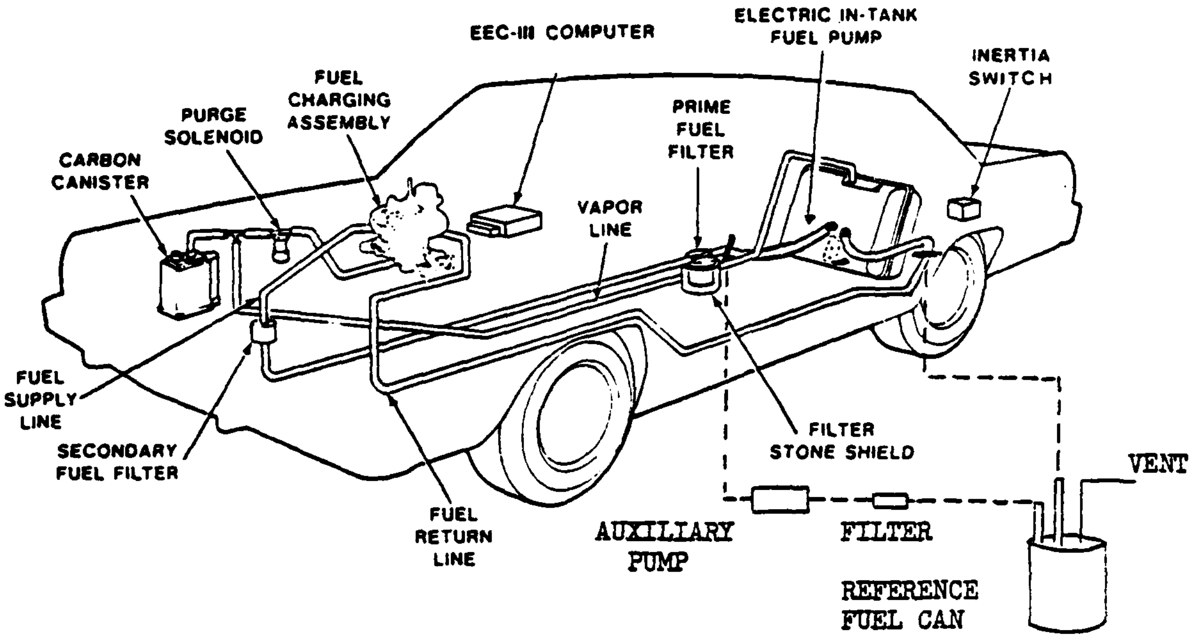
4. When changing from one reference fuel to another, the following steps should be followed, or else reference fuels may become contaminated:

   a. With the engine shut off, disconnect the fuel return line from the reference fuel can and connect it to an extra empty can. Connect the fuel pump supply line to the new reference fuel can and run the engine for approximately 30 seconds, purging the old reference fuel into the extra can (timing is dependent upon length of added fuel lines). After the sytem is purged, shut the engine off and connect the fuel return line to the new reference fuel can forming a closed fuel loop. Now the vehicle is ready to be tested on the desired reference fuel.

   b. When changing to another reference fuel, repeat Step a.

PROCECURE FOR SETTING UP VEHICLES AND HANDLING REFERENCE FUELS -- FORD VEHICLES EQUIPPED WITH CENTRAL FUEL INJECTION SYSTEM - (Continued)

CENTRAL FUEL INJECTION FUEL SYSTEM (5.0L LINCOLN/MARK VI)



1/ NOTE:

Some vehicles have both a low pressure in-tank fuel pump and a high pressure under body fuel pump. The on-board high pressure pump may be used if supplied with an auxiliary pump. In all cases, it is required that on-board pumps not used, be disarmed. The inertia switch located in the rear of the vehicle will disarm both pumps. Fuel lines on some vehicles may be accessed only in the engine compartment, or by dropping the fuel tank.

ANNEX B

to the

CRC E-15-83 TECHNIQUE

ONR MEASUREMENT WITH KNOCK SENSOR-EQUIPPED VEHICLES

ANNEX B

TO THE CRC E-15-83 TECHNIQUE

ONR MEASUREMENT WITH KNOCK SENSOR-EQUIPPED VEHICLES AUDIBLE KNOCK TECHNIQUE

Integrated electronic controls on some vehicles precludes the use of instrumentation to measure spark retard with knock sensor-equipped vehicles. Being integrated with other systems in the vehicle, there is no reference to a base spark advance; therefore, an audible knock technique must be used.

The audible technique will be used on all knock sensor-equipped vehicles.

Prepare the vehicle according to Section C (Vehicle Preparation) of the E-15-83 Technique. Make tank fuel observations as described in D.3.d(2) of the technique.

Using an estimated non-knocking fuel, accelerate as defined in paragraph B-3. Using lower octane fuels, determine the fuels for the following conditions:

1. Highest octane fuel that gives borderline knock (Maximum Requirement).

2. Lowest octane fuel that gives borderline knock (Minimum Requirement).

These are to be determined with FBRSU, FBRU, and PR fuels. Data should be recorded on data form DFMF-26-1183. Use a separate data form for each reference fuel series.

A P P E N D I X   E

1983 OCTANE NUMBER REQUIREMENT SURVEY DATA

GLOSSARY

(For Appendix E Only)

Emission Certification (EMCT):	A	Altitude
	C	California
	F	Federal
	B	Both California and Altitude
Knock Sensor:	Y	Yes
	N	No
Air Conditioner:	Y	Yes
	N	No
Spark Advance:	+	Before Top Center
	-	After Top Center
Test Fuel:	1	Tank Fuel
	2	FBRSU
	3	FBRU
	4	PR
Octane Number Requirements: (expressed as Research ON)	L	Less than lowest available ON for FBRU and FBRSU fuels and less than 76 for PR fuels
	H	Higher than highest available ON for FBRU and FBRSU fuels and higher than 97 ON for PR fuels
	F	Part-throttle requirement greater than four numbers below maximum-throttle requirement
Noise Type (NTYPE):	K	Spark Knock
	S	Surface Ignition
	B	Both Spark Knock and Surface Ignition
Throttle:	M	Maximum
	P	Part
Gear:	1-5	Manual and Automatic
Manifold Vacuum (MV):		Inches Hg
Owner Reported Knock (OWKNK):	Y	Yes, Not Objectionable
	O	Objectionable
	N	No
Rater-Reported Noise Intensity (NINT):	N	None
	B	Borderline
	A	Above Borderline

			VEHICLE DESCRIPTION							WEATHER				OCTANE NUMBER REQUIREMENT DATA										TANK FUEL INFORMATION								
														MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	ENCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
1	29	BA7 F17M5	F	N	8.2	N	+6	+6	6087	70	30.29	60	3	88.0	K	M	4	2200	0.0	F				1				N				
													2	88.5	K	M	4	2800	0.0													
													4	88.0	K	M	4	1500	0.0													
30	4	BA8 F18M5	F	N	8.5	Y	+6	+6	9891	87	29.18	71	3	85.0	K	P	4	1500	2.0	85.0	4	1500	2.0	1	N	98.2	86.8	N				
													2	86.0	K	M	4	1750	0.0													
													4	84.0	K	M	3	1900	0.0													
33	4	DEC 222A3	F	N	9.0	Y	+10	+10	7745	79	29.24	101	3	88.0	K	M	2	2200	0.5	86.0	3	1950	3.5	1	N	92.3	82.0	N				
													2	90.0	K	P	3	2250	3.5													
													4	87.0	K	M	2	2200	0.5													
165	6	DEC 222A3	F	N	9.0	Y	+10	+10	6966	76	30.16	75	3	96.0	K	P	3	2450	5.0	96.0	3	2450	5.0	1								
													2	100.0	K	P	3	2500	5.0													
													4	92.0	K	M	3	2450	1.6													
362	31	DEC 222A3	F	N	9.0	Y	+10	+10	4224	89	28.74	130	3	90.0	K	P	3	1800	4.0	90.0	3	1800	4.0	1								
													2																			
													4																			
284	28	DKC 222A3	F	N	9.0	Y	+10	+10	20175	70	29.36	50	3	89.0	K	M	2	2100	1.0	F				1				B	K	2	2050	1.0
													2	90.0	K	M	2	2200	1.0													
													4	89.0	K	M	2	2100	1.0													
256	8	DKG 226A3	F	N	8.2	Y	+7	+7	14624	75	29.77	53	3	82.0	K	M	2	2600	1.2	F				1				N				
													2	84.0	K	M	2	2500	1.2													
													4	80.0	K	M	2	2600	1.2													
166	6	DMP 252A3	F	N	8.5	Y	+13	+16	12600	77	29.89	105	3	H	K	P	3	1450	8.0	H	3	1450	8.0	1	N	99.4	88.2	A	K	3	1500	8.0
													2	H	K	P	3	1500	8.0													
													4	96.0	K	M	2	1450	1.0													

VEHICLE DESCRIPTION									WEATHER				OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE						OCT NO		RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
41	4	GC8 F41A4	F	N	8.5	Y	+10	+10	6864	88	29.23	85	3	84.0	K	M	3	1950	0.5	80.0	4	1800	4.0	1	N	91.6	82.4	N				
													2	84.0	K	M	4	2000	1.5													
													4	82.0	K	M	3	2000	0.5													
148	23	GC8 F41A4	F	N	8.5	Y	+10	+10	7620	55	28.56	53	3	91.0	K	M	4	1600	1.0	89.0	4	2000	2.0	1				B	K	4	1600	1.0
													2	91.0	K	M	4	1600	1.0													
													4	91.0	K	M	4	1600	1.0													
149	23	GC8 F41A4	F	N	8.5	Y	+10	+10	8358	76	28.52	133	3	86.0	K	M	4	1600	0.8	83.0	4	1500	2.0	1				N				
													2	86.0	K	M	2	2400	0.8													
													4	85.0	K	M	4	1600	0.8													
277	8	GC8 F41A4	F	N	8.5	Y	+10	+10	6152	86	29.85	95	3	85.0	K	M	4	1900	1.0	F				1				N				
													2	86.0	K	M	4	1650	1.0													
													4	84.0	K	M	4	1650	1.0													
150	23	GJP F20A3	F	N	9.3	Y	0	0	8261	54	28.65	52	3	95.0	K	M	3	1600	2.5	95.0	3	1600	3.5	1				A	K	3	2700	0.6
													2	96.0	K	M	3	3600	0.6													
													4	92.0	K	M	3	1700	2.5													
151	23	GJP F20A3	F	N	9.3	Y	0	0	7981	66	28.45	76	3	95.0	K	M	3	2700	0.4	94.0	3	1800	3.0	1				A	K	3	1600	2.2
													2	96.0	K	M	3	2700	0.4													
													4	92.0	K	M	3	1700	2.2													
90	5	GK8 F41A4	F	N	8.5	Y	+10	+10	7042	70	30.00	61	3	87.0	K	M	4	1950	3.5	F				1	N	93.2	82.3	N				
													2	87.0	K	M	4	1850	3.5													
													4	86.0	K	M	2	1950	1.0													
315	26	HAR F25A3	F	N	8.2	Y	+ 8	+ 8	7824	71	29.86	68	3	88.0	K	M	3	1650	1.0	85.0	3	1650	2.0	1		91.8	82.0	N				
													2	89.0	K	M	3	1550	1.0													
													4	87.0	K	M	3	1650	1.0													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	WEATHER AMB TMP	WEATHER BAROM	WEATHER HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THR	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
135	23	HAX 228A3	F	N	8.5	Y	+ 8	+10	12856	70	28.66	54	3	94.0	K	P	3	1400	5.0	94.0	3	1400	5.0	1				A	K	3	1350	4.0
													2	97.0	K	P	3	1400	5.0													
													4	91.0	K	M	3	1500	2.2													
196	6	HF1 228A3	F	N	8.5	Y	+10	+10	8887	72	29.95	113	3	91.0	K	M	3	1600	1.8	91.0	3	1600	2.8	1								
													2	92.0	K	M	3	1700	1.8													
													4	90.0	K	M	3	1700	1.8													
38	4	HGA 238A3	F	N	8.0	Y	+15	+15	7686	82	28.94	75	3	89.0	K	M	3	1950	1.0	88.0	3	1500	4.0	1	N	91.5	83.7	N				
													2	90.0	K	P	3	1700	4.0													
													4	87.0	K	M	3	1800	1.0													
241	46	HGA 238A3	F	N	8.0	Y	+13	+15	12911	74	29.40		3	78.0	K	M	3	2000	1.5					1				N				
													2	78.0	K	M	3	2050	1.5													
													4	L																		
335	7	HGA 238A3	F	N	8.0	Y	+15	+15	16471	70	30.24	64	3	96.0	K	P	3	1750	5.0	96.0	3	1750	5.0	1	0	95.0	85.1	A	K	3	1500	5.0
													2	100.0	K	P	3	1750	5.0													
													4	90.0	K	M	2	1900	0.6													
58	41	HJO F18A3	C	N	9.0	Y	+ 8	+ 8	14895	75	29.94	81	3	90.0	K	M	3	2900	1.0	F				1								
													2	92.0	K	M	3	2900	1.0													
													4	88.0	K	M	3	2900	1.0													
136	23	HJO F18A3	F	N	9.0	Y	+ 9	+ 8	7474	72	28.43	118	3	91.0	K	M	3	2600	0.6	F				1				N				
													2	91.0	K	M	3	2600	0.6													
													4	90.0	K	M	3	2500	0.6													
242	46	HTC 216A3	F	N	8.6	Y	+ 6	+ 6	18935	79	29.40	85	3	85.0	K	M	3	2250	2.0					1				N				
													2	85.0	K	M	3	2150	2.0													
													4	84.0	K	M	3	2200	2.0													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
														MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWNK	RES	MOT	NINTER	NTYPE	GEAR	RPM	MV
137	23	IAE 230A3	F	N	8.5	Y	+15	+15	6052	66	28.75	76	3	88.0	K	M	3	2400	1.0	88.0	3	1900	3.0	1				N				
													2	87.0	K	M	3	2400	1.0													
													4	85.0	K	M	3	2400	1.0													
197	6	IAE 230A3	F	N	8.5	Y	+15	+15	7146	80	30.02	89	3	88.0	K	M	3	2500	2.2	88.0	3	1850	5.0	1	N	92.8	83.4	N				
													2	91.0	K	M	3	2500	2.2													
													4	88.0	K	M	3	2400	2.2													
271	8	IAE 230A3	F	N	8.5	Y	+15	+15	15490	75	30.11	58	3	98.0	K	M	3	2500	1.5	94.0	3	2050	3.0	1				A	K	2	2800	1.0
													2	99.0	K	M	2	2850	1.0													
													4	92.0	K	M	3	2250	1.5													
316	26	IAE 230A3	F	N	8.5	Y	+15	+15	5985	76	29.75	120	3	84.0	K	M	3	1800	1.5	84.0	3	1800	3.0	1				N				
													2	84.0	K	M	3	1925	1.5													
													4	80.0	K	M	3	1775	1.5													
59	41	IAR F25A3	C	N	8.2	Y	+ 8	+ 8	8390	71	30.08	69	3	90.5	K	M	2	2400	1.0	F				1				N				
													2	92.0	K	M	2	2400	1.0													
													4	88.0	K	M	2	2400	1.0													
138	23	IAR F25A3	F	N	8.2	Y	+ 8	+ 8	11585	70	28.58	110	3	93.0	K	M	3	2700	1.2	F				1				B	K	3	1700	1.2
													2	94.0	K	M	3	2700	1.2													
													4	90.0	K	M	3	1800	1.2													
198	6	IAR F25A3	F	N	8.2	Y	+ 8	+ 8	20042	77	29.89	105	3	96.0	K	M	3	2500	1.8	93.0	3	1800	3.0	1	Y	92.7	83.3	A	K	3	1800	1.8
													2	97.0	K	M	3	2700	1.8													
													4	92.0	K	M	3	1800	1.8													
243	46	IAR F25A3	F	N	8.2	Y	+ 8	+ 8	9155	73	29.52	74	3	87.0	K	M	3	2750	1.5					1				N				
													2	87.0	K	M	3	2700	1.5													
													4	85.0	K	M	3	2750	1.5													

	VEHICLE DESCRIPTION									WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE						OCT NO		RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	TPHA	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
199	6	IBA 238A3	F	N	8.0	Y	+12	+15	13368	64	30.30	50	3	98.0	K	P	3	2000	8.0	98.0	3	2000	8.0	1								
													2	100.0	K	P	3	1900	8.0													
													4	92.0	K	M	2	2000	0.8													
200	6	IBA 238A3	F	N	8.0	Y	+15	+15	14078	51	30.00	38	3	97.0	K	P	3	1700	9.0	97.0	3	1700	9.0	1								
													2	101.0	K	P	3	1700	9.0													
													4	90.0	K	M	3	1600	0.8													
87	5	IBY 450A3	F	N	8.0	Y	+20	+20	7925	71	29.97	55	3	91.0	K	M	3	1800	1.8	91.0	3	1500	5.0	1	N	93.1	82.0	B	K	3	1700	5.0
													2	92.0	K	P	3	1500	5.0													
													4	89.0	K	M	3	1800	1.8													
139	23	IBY 450A4	F	N	8.0	Y	+18	+20	16400	68	28.66	52	3	89.0	K	M	4	1600	1.8	89.0	4	1400	3.0	1				N				
													2	89.0	K	M	4	1700	1.8													
													4	89.0	K	M	4	1500	1.8													
140	23	IBY 450A4	F	N	8.0	Y	+16	+20	11838	59	28.63	60	3	91.0	K	M	3	1800	1.4	91.0	4	1400	4.0	1				B	K	4	1200	2.0
													2	93.0	K	M	3	1900	1.4													
													4	90.0	K	M	3	1750	1.4													
201	6	IBY 450A4	F	N	8.0	Y	+20	+20	10294	50	29.85	30	3	96.0	K	P	4	1000	4.0	96.0	4	1000	4.0	1	N	97.3	86.5	B	K	4	1000	4.0
													2	98.0	K	P	4	1000	4.0													
													4	91.0	K	M	4	1000	1.6													
244	46	IBY 450A4	F	N	8.0	Y	+20	+20	10752	74	29.33	63	3	87.0	K	M	3	2100	1.5	84.0	3	1850	4.0	1				N				
													2	88.0	K	M	3	2100	1.5													
													4	86.0	K	M	3	2200	1.5													
245	46	IBY 450A4	F	N	8.0	Y	+20	+20	7393	76	29.34	62	3	86.0	S	M	3	2050	1.5	86.0	3	1375	3.0	1				N				
													2	86.0	S	M	3	2050	1.5													
													4	85.0	S	M	3	2050	1.5													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THR	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
317	26	IBY 450A4	F	N	8.0	Y	+20	+20	12014	79	30.08	65	3	89.0	K	M	4	1800	2.0	88.0	4	1050	3.0	1		95.2	85.0	N				
													2	90.0	K	M	2	1800	2.5													
													4	88.0	K	M	4	1800	2.0													
88	5	ICY 450A4	F	N	8.0	Y	+16	+20	17180	71	29.95	60	3	88.0	K	M	4	1050	3.0	88.0	4	1100	4.0	1								
													2	89.0	K	M	3	1950	1.7													
													4	87.0	K	M	3	1900	1.7													
141	23	ICY 450A4	F	N	8.0	Y	+18	+20	13131	70	28.81	88	3	91.0	K	M	3	2300	1.2	90.0	4	1500	3.0	1				N				
													2	92.0	K	M	3	2300	1.2													
													4	89.0	K	M	3	2300	1.2													
202	8	ICY 450A4	F	N	8.0	Y	+18	+20	12460	75	29.74	86	3	91.0	K	P	4	1000	4.0	91.0	4	1000	4.0	1								
													2	91.0	K	P	4	1000	4.0													
													4	89.0	K	M	4	1000	2.8													
336	7	IEY 450A4	F	N	8.0	Y	+20	+20	12843	70	30.30	60	3	92.0	K	M	4	1850	1.7	92.0	4	1850	4.0	1	0	92.0	82.4	A	K	4	1800	1.7
													2	92.0	K	M	4	1750	1.7													
													4	88.0	K	M	3	2200	1.1													
60	41	IGA 238A3	C	N	8.0	Y	+13	+15	13040	72	29.96	72	3	91.0	K	M	3	1750	1.0	89.0	3	1750	2.0	1				B	K	3	1750	
													2	91.5	K	M	3	1750	1.0													
													4	89.0	K	M	3	1750	1.0													
203	6	IGA 238A3	F	N	8.0	Y	+12	+15	22046	72	29.83	81	3	98.0	K	P	3	1600	5.0	98.0	3	1600	5.0	1								
													2	100.0	K	P	3	1600	8.0													
													4	93.0	K	M	3	1700	0.6													
204	6	IGA 238A3	F	N	8.0	Y	+15	+15	11081	79	30.04	90	3	100.0	K	P	3	2000	9.0	100.0	3	2000	9.0	1	0	97.1	86.5	A	K	3	2100	9.0
													2	H	K	P	3	2000	9.0													
													4	92.0	K	M	3	1900	0.6													

VEHICLE DESCRIPTION										WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
													MAXIMUM						PART THROTTLE									RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THPR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
205	6	IGA 238A3	F	N	8.0	Y	+15	+15	16510	81	29.86	72	3	H	K	P	3	1550	9.0	H	3	1550	9.0	1								
													2	H	K	P	3	1600	9.0													
													4	94.0	K	M	3	1550	1.2													
246	46	IGA 238A3	F	N	8.0	Y	+15	+15	17204	80	29.38	104	3	87.5	K	M	3	2050	1.0	87.0	3	1775	6.0	1				N				
													2	88.0	K	M	3	2100	1.0													
													4	86.0	K	M	3	2050	1.0													
247	46	IGA 238A3	F	N	8.0	Y	+15	+15	15477	74	29.40	64	3	87.0	K	M	3	2050	1.0	84.0	3	2000	3.0	1				N				
													2	87.0	K	M	3	2100	1.0													
													4	86.0	K	M	3	2250	1.0													
272	8	IGA 238A3	F	N	8.0	Y	+15	+15	10788	70	30.24	29	3	90.0	K	M	3	1650	1.3	88.0	3	1600	4.0	1				N				
													2	92.0	K	M	3	1750	1.3													
													4	88.0	K	M	3	1650	1.3													
273	8	IGA 238A3	F	N	8.0	Y	+15	+15	22520	75	29.95	77	3	93.0	K	M	3	1700	1.5	91.0	3	1550	5.0	1				B	K	3	1750	1.5
													2	94.0	K	M	3	1650	1.5													
													4	88.0	K	M	3	1750	1.5													
318	26	IGY 450A3	F	N	8.0	Y	+20	+20	14429	77	29.85	100	3	89.0	K	M	3	1725	1.5	89.0	3	1450	2.5	1		95.6	85.2	N				
													2	89.0	K	M	3	1800	1.5													
													4	87.0	K	M	3	1750	1.5													
39	4	IGY 450A4	F	N	8.0	Y	+20	+20	7742	96	29.00	108	3	86.0	K	M	3	1800	1.2	82.0	4	1250	3.0	1	N	92.6	83.1	N				
													2	87.0	K	M	3	2000	1.2													
													4	86.0	K	M	3	1900	1.2													
14	29	IJO F18A3	F	N	9.0	Y	+ 8	+ 8	26055	70	30.06	60	3	98.0	K	P	3	2100	6.0	98.0	3	2100	6.0	1				A	K	3	2100	6.0
													2	101.0	K	P	3	2100	6.0													
													4	91.0	K	M	3	2800	1.4													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE						OCT NO		RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
206	6	IJO F18M5	F	N	9.0	Y	+ 8	+ 8	9950	63	30.44	48	3	93.0	K	M	4	2500	0.4	92.0	4	1800	1.0	1	N	92.3	83.4	B	K	4	2300	0.4
													2	94.0	K	M	4	3000	0.4													
													4	92.0	K	M	4	2400	0.4													
89	5	IXR F25A3	F	N	8.2	Y	+ 8	+ 8	24867	70	29.91	52	3	92.0	K	M	2	2750	1.0	F				1								
													2	94.0	K	M	2	2750	1.0													
													4	91.0	K	M	2	2700	1.0													
248	46	IXR F25A3	F	N	8.2	Y	+ 8	+ 8	6200	76	29.65	80	3	88.0	K	M	3	2700	1.5					1				B	K	3	2600	1.5
													2	90.0	K	M	3	2700	1.5													
													4	84.0	K	M	3	2600	1.5													
274	8	IXR F25A3	F	N	8.2	Y	+ 8	+ 8	11645	75	29.97	37	3	90.0	K	M	2	2550	1.0	88.0	3	1750	6.0	1				B	K	2	2500	1.0
													2	91.0	K	M	2	2500	1.0													
													4	84.0	K	M	2	2750	1.0													
234	46	KEC 222A3	F	N	9.0	Y	+10	+10	6832	75	29.20	70	3	78.0	K	M	2	2500	1.5					1				N				
													2	79.5	K	M	2	2750	1.5													
													4	78.0	K	M	2	2550	1.5													
359	31	KEC 222M5	F	N	9.0	Y	+10	+10	4641	80	28.71	108	3	82.0	K	P	4	1000	4.0	82.0	4	1000	4.0	1								
													2																			
													4																			
360	31	KEC 222M5	F	N	9.0	Y	+10	+10	6747	78	28.90	74	3	90.0	K	P	4	1500	4.0	90.0	4	1500	4.0	1								
													2																			
													4																			
32	4	KKC 222A3	F	N	9.0	N	+10	+10	5616	87	29.10	118	3	89.0	K	P	3	2150	3.5	89.0	3	2150	3.5	1	N	91.4	82.8	N				
													2	92.0	K	P	3	2150	3.5													
													4	87.0	K	M	2	2100	0.8													

VEHICLE DESCRIPTION										WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE						OCT NO		RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THER	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
75	5	KKC 222A3	F	N	9.0	Y	+10	+10	4055	70	29.88	52	3	88.0	K	M	2	2000	1.7	87.0	3	1800	5.0	1	N	94.6	84.0	N				
													2	89.5	K	M	2	3700	1.7													
													4	88.0	K	M	2	1900	1.7													
161	6	KKC 222A3	F	N	9.0	Y	+10	+10	8053	79	29.80	101	3	96.0	K	P	3	1900	5.0	96.0	3	1900	5.0	1								
													2	98.0	K	P	3	1900	5.0													
													4	91.0	K	M	3	1850	1.1													
235	46	KKC 222A3	F	N	9.0	Y	+ 9	+ 9	17872	76	29.42	70	3	81.0	K	M	3	2600	2.0					1				N				
													2	83.0	K	M	3	2550	2.0													
													4	79.0	K	M	3	2450	2.0													
255	8	KKC 222A3	F	N	9.0	Y	+10	+10	6070	70	29.91	40	3	86.0	K	M	3	1950	1.5	F				1				N				
													2	86.0	K	M	3	2000	1.5													
													4	82.0	K	M	2	2300	1.0													
301	26	KKC 222A3	F	N	9.00	Y	+10	+10	16207	83	29.94	118	3	87.0	K	M	2	1750	1.5	85.0	3	1500	4.0	1		92.0	82.3	N				
													2	89.0	K	M	3	1500	1.5													
													4	87.0	K	M	2	1650	1.5													
328	7	KKC 222A3	F	N	9.0	Y	+10	+10	14465	70	30.40	56	3	94.0	K	M	3	2450	1.0	94.0	3	2450	4.0	1				A	K	2	2600	0.6
													2	96.0	K	M	2	2600	0.6													
													4	90.0	K	M	3	2500	1.0													
361	31	KKC 222M5	F	N	9.0	Y	+10	+10	5634	83	28.76	94	3	88.0	K	M	3	3000	2.0	86.0	4	950	3.0	1								
													2																			
													4																			
162	6	KKG 226A3	F	N	8.2	Y	+ 7	+ 7	17159	69	29.89	58	3	86.0	K	M	2	2200	1.2	85.0	3	2500	2.2	1								
													2	86.0	K	M	3	2500	1.8													
													4	84.0	K	M	3	2200	1.2													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
														MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
163	6	KKG 226A3	F	N	8.2	Y	+ 7	+ 7	16320	82	29.84	102	3	85.0	K	M	3	1800	3.2	84.0	3	2300	2.0	1								
													2	85.0	K	M	3	2400	1.8													
													4	83.0	K	M	3	2300	1.8													
164	6	KLC 222A3	F	N	9.0	Y	+10	+10	11195	83	30.05	119	3	98.0	K	P	3	2500	4.0	98.0	3	2500	4.0	1								
													2	99.0	K	P	3	2500	4.0													
													4	91.0	K	M	3	2000	1.5													
40	4	LAE 230A3	F	N	8.5	Y	+14	+14	13770	75	29.13	91	3	92.0	K	P	3	1500	4.0	92.0	3	1500	4.0	1	0	93.7	83.3	8	K	3	1575	4.0
													2	94.0	K	P	3	1450	4.0													
													4	89.0	K	P	3	1450	4.0													
207	6	LAE 230A3	F	N	8.5	Y	+15	+15	6226	75	30.00	57	3	90.0	K	P	3	1500	5.0	90.0	3	1500	5.0	1	N	93.1	82.4	N				
													2	92.0	K	P	3	1600	5.0													
													4	90.0	K	M	3	1600	0.6													
294	28	LAE 230A3	F	N	8.5	Y	+15	+15	15139	70	29.36	50	3	91.0	K	M	3	1600	1.5	90.0	3	1600	3.0	1				N				
													2	91.0	K	M	3	1700	1.5													
													4	87.0	K	M	3	1700	1.5													
319	26	LAE 230A3	F	N	8.5	Y	+15	+15	5132	78	29.82	97	3	89.0	K	M	2	1150	0.7	88.0	3	1600	5.0	1		91.3	82.6	N				
													2	89.0	K	M	2	1150	0.7													
													4	86.0	K	M	2	1200	0.7													
15	29	LAE 230A4	F	N	8.5	Y	+15	+15	12200	70	30.07	59	3	84.5	K	P	3	1650	6.0	84.5	3	1650	6.0	1	N			N				
													2	86.0	K	P	3	1750	6.0													
													4	82.0	K	M	3	2000	1.1													
16	29	LAE 230A4	F	N	8.5	Y	+15	+15	6555	70	30.29	59	3	89.5	K	P	3	1450	6.0	89.5	3	1450	6.0	1				N				
													2	91.5	K	P	3	1400	6.0													
													4	87.0	K	P	3	1450	6.0													

VEHICLE DESCRIPTION										WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
														MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
142	23	LAR F25A3	F	N	8.2	Y	+ 4	+ 8	10006	79	28.50	54	3	94.0	K	M	3	2700	1.2	90.0	3	2000	2.5	1				A	K	3	1600	1.4
													2	96.0	K	M	3	2700	1.2													
													4	90.0	K	M	3	1800	1.4													
339	7	LAR F25A3	F	N	8.2	Y	+ 8	+ 8	15755	70	30.02	62	3	94.0	K	M	3	1750	1.5	94.0	3	1850	5.0	1	N	91.6	82.2	A	K	2	3000	1.1
													2	97.0	K	P	3	1950	5.0													
													4	90.0	K	M	3	1900	1.5													
208	6	LBA 238A3	F	N	8.0	Y	+13	+15	8648	57	29.97	28	3	96.0	K	P	3	1900	8.0	96.0	3	1900	8.0	1								
													2	100.0	K	P	3	2000	8.0													
													4	93.0	K	M	2	2800	0.4													
143	23	LBY 450A4	F	N	8.0	Y	+18	+20	12616	76	28.39	96	3	88.0	K	M	3	1900	0.8	88.0	4	1100	3.0	1				N				
													2	89.0	K	M	3	1900	0.8													
													4	88.0	K	M	3	1900	0.8													
209	6	LCY 450A4	F	N	8.0	Y	+23	+20	13080	84	29.86	111	3	90.0	K	M	3	1700	1.0	89.0	4	1000	2.2	1	N	93.2	83.0	N				
													2	91.0	K	M	3	1900	1.0													
													4	87.0	K	M	3	1700	1.0													
249	46	LCY 450A4	F	N	8.0	Y	+20	+20	12912	74	29.28	82	3	85.0	K	M	3	2175	1.0	85.0	3	1975	2.0	1				N				
													2	85.5	K	M	3	2250	1.0													
													4	84.0	K	M	3	2150	1.0													
144	23	LEY 450A4	F	N	8.0	Y	+11	+20	11339	64	28.54	54	3	91.0	K	M	3	1800	1.0	90.0	4	1150	3.0	1				N				
													2	92.0	K	M	3	1800	1.0													
													4	88.0	K	M	3	1800	1.0													
210	6	LEY 450A4	F	N	8.0	Y	+20	+20	6958	75	29.72	86	3	90.0	K	M	4	1200	2.0	90.0	4	1200	2.2	1	N	92.9	83.0	N				
													2	90.0	K	M	4	1200	2.0													
													4	89.0	K	M	4	1200	2.0													

VEHICLE DESCRIPTION										WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE								RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
61	41	LGA 238A3	C	N	8.0	Y	+15	+15	7187	71	30.06	78	3	89.0	K	M	3	1750	1.0	F				1				B	K	3	1750	1.0
													2	89.5	K	M	3	1750	1.0													
													4	89.0	K	M	3	1750	1.0													
211	6	LGA 238A3	F	N	8.0	Y	+10	+15	21869	69	29.98	81	3	101.0	K	P	3	1700	11.0	101.0	3	1700	11.0	1								
													2	H	K	P	3	1700	11.0													
													4	95.0	K	M	2	1800	1.4													
212	6	LGA 238A3	F	N	8.0	Y	+13	+15	24618	82	29.86	102	3	95.0	K	M	3	1700	2.4	93.0	3	1850	3.7	1								
													2	96.0	K	M	2	2500	2.0													
													4	92.0	K	M	3	1700	2.4													
275	8	LGA 238A3	F	N	8.0	Y	+15	+15	23829	80	29.48	84	3	90.0	K	M	3	1650	1.2	86.0	3	1550	3.5	1				N				
													2	90.0	K	M	3	1600	1.2													
													4	86.0	K	M	3	1600	1.2													
276	8	LGA 238A3	F	N	8.0	Y	+15	+15	21015	75	30.06	45	3	90.0	K	M	2	2100	0.8	F				1				N				
													2	90.0	K	M	2	2000	0.8													
													4	86.0	K	M	2	1800	0.8													
337	7	LGA 238A3	F	N	8.0	Y	+15	+15	11225	71	30.00	59	3	89.0	K	M	3	1250	0.8	88.0	3	1150	6.0	1	N	93.4	83.0	B	K	3	1300	0.8
													2	89.0	K	M	3	1250	0.8													
													4	88.0	K	M	3	1600	0.7													
17	29	LJP F20A3	F	N	9.3	Y	+10	+10	7915	70	29.94	60	3	94.0	K	M	3	2400	1.5	91.0	3	2100	4.5	1	Y	92.4	83.9	A	K	3	2300	1.5
													2	95.0	K	M	3	2400	1.5													
													4	92.0	K	M	3	2300	1.5													
145	23	LJP F20A3	F	N	9.3	Y	0	0	6916	74	28.45	94	3	94.0	K	M	3	2800	0.8	93.0	3	1700	3.5	1				A	K	3	1700	2.6
													2	96.0	K	M	3	2800	0.8													
													4	91.0	K	M	3	2800	0.8													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THR	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
338	7	LJP F20A3	F	N	9.3	Y	0	0	6268	71	30.28	62	3	94.0	K	M	3	3350	1.0	94.0	3	2150	4.0	1	0	94.1	84.0	A	K	2	3800	0.9
													2	96.0	K	M	2	4400	0.9													
													4	92.0	K	M	3	3050	1.0													
146	23	LJO F18A3	F	N	9.0	Y	+ 8	+ 8	8008	63	28.52	63	3	90.0	K	M	2	2600	0.6	87.0	3	2100	4.0	1				N				
													2	91.0	K	M	2	2600	0.6													
													4	88.0	K	M	2	2600	0.6													
62	41	LXR F25A3	C	N	8.2	Y	+ 8	+ 8	7545	72	30.16	67	3	90.0	K	M	3	2700	1.2	F				1				N				
													2	91.0	K	M	3	2700	1.2													
													4	87.0	K	M	3	2700	1.2													
295	28	LXR F25A3	F	N	8.2	Y	+ 8	+ 8	16090	70	29.38	50	3	89.0	K	M	2	2550	1.0	86.0	3	2000	5.0	1				N				
													2	90.0	K	M	2	2550	1.0													
													4	87.0	K	M	2	2500	1.0													
147	23	LXX 228A3	F	N	8.5	Y	+ 9	+10	12248	56	28.41	64	3	94.0	K	P	3	1300	5.0	94.0	3	1300	5.0	1				A	K	3	1350	3.0
													2	95.0	K	P	3	1300	5.0													
													4	90.0	K	M	3	1300	1.8													
320	26	LXX 228A3	F	N	8.5	Y	+10	+10	13277	74	30.12	42	3	90.0	K	M	3	1250	2.5	90.0	3	1250	5.0	1		92.5	82.6	B	K	3	1200	2.5
													2	91.0	K	M	3	1300	2.5													
													4	89.0	K	M	3	1300	2.5													
239	46	MA2 216A3	F	N	9.0	Y	+10	+1C	13741	75	29.34		3	88.0	K	M	3	1850	1.0	87.5	3	1700	3.0	1				N				
													2	88.0	K	M	3	1850	1.0													
													4	87.0	K	M	3	1800	1.0													
260	8	MA2 216A3	F	N	9.0	Y	+10	+10	18809	67	29.85	66	3	89.0	K	M	3	1600	1.4	86.0	3	1350	3.0	1				N				
													2	90.0	K	M	3	1450	1.4													
													4	89.0	K	M	3	1600	1.4													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE								RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
117	32	MA2 216M4	F	N	9.0	Y	+ 8	+ 8	5844	70	29.64	50	3	88.0	K	M	4	1450	0.3	88.0	4	1400	1.0	1	N	92.2	82.9	N				
													2	88.0	K	M	4	1700	0.3													
													4	88.0	K	M	3	1400	0.4													
118	32	MA4 216A3	F	N	9.0	Y	+14	+14	9344	70	29.31	54	3	91.0	K	M	3	2400	0.9	91.0	3	2000	2.0	1	N	91.3	82.8	B	K	3	1500	2.0
													2	93.0	K	M	3	2500	0.9													
													4	92.0	K	M	2	2200	1.1													
119	32	MA4 216A3	F	N	9.0	Y	+14	+14	12191	70	29.31	70	3	91.0	K	P	3	1300	2.5	91.0	3	1300	2.5	1	N							
													2	90.0	K	M	3	2400	0.9													
													4	90.5	K	M	3	1950	0.9													
120	32	MA4 216A3	F	N	9.0	Y	+14	+14	13535	70	29.42	50	3	92.0	K	P	3	1300	1.5	92.0	3	1300	1.5	1	Y	91.0	82.4	B	K	3	2200	0.5
													2	90.0	K	P	3	1300	1.5													
													4	91.0	K	P	3	1350	1.5													
121	32	MA5 F16M5	F	N	9.0	N	+15	+15	7422	70	29.47	50	3	93.0	K	P	4	2200	3.0	93.0	4	2200	3.0	1	N							
													2	91.0	K	P	4	2100	3.0													
													4	92.0	K	M	4	2100	0.5													
122	32	MB3 238A3	F	N	8.6	Y	+10	+10	11226	70	29.62	49	3	89.0	K	M	2	1900	0.7	88.0	3	1600	5.0	1	N	90.8	84.4	B	K	2	1850	0.7
													2	89.0	K	M	2	1900	0.7													
													4	90.0	K	M	2	1900	0.7													
123	32	MCX 133A3	F	N	8.6	Y	+10	+10	8697	70	29.54	56	3	86.0	K	M	3	2300	1.0	85.0	3	1650	2.0	1	Y	90.9	82.8	N				
													2	87.0	K	M	3	2400	1.0													
													4	87.0	K	M	3	2300	1.0													
261	8	MD3 238A3	F	N	8.6	Y	+10	+10	6044	75	29.92	86	3	85.0	K	M	3	2000	1.5	85.0	3	1900	3.5	1				N				
													2	86.0	K	M	3	1850	1.5													
													4	84.0	K	M	3	1900	1.5													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
														MAXIMUM					PART THROTTLE								RATER					
							SPARK ADVANCE																		OCT NO							
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THER	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
179	6	MEF F50A4	F	N	8.4	Y	+20	+20	10602	87	30.11	112	3	94.0	K	M	4	1100	2.0	93.0	4	1100	3.0	1	Y	95.9	87.1	N				
													2	93.0	K	M	4	1100	2.0													
													4	92.5	K	M	4	1100	2.0													
180	6	MEF F50A4	F	N	8.4	Y	+20	+20	14989	68	30.24	52	3	94.0	K	M	4	1050	1.0	93.0	4	1200	1.4	1	N	97.1	86.3	N				
													2	93.0	K	M	4	1100	1.0													
													4	92.0	K	M	4	1200	1.0													
181	6	MEF F50A4	F	N	8.4	Y	+20	+20	7586	65	30.20	33	3	90.0	K	M	4	1000	0.4	90.0	4	1000	0.6	1								
													2	89.5	K	M	2	2500	0.4													
													4	88.0	K	M	4	1000	0.4													
182	6	MEX 133A3	F	N	8.6	Y	+10	+10	10200	62	29.94	58	3	92.0	K	M	2	1900	2.3	91.0	3	2200	2.7	1								
													2	93.0	K	M	2	2200	2.4													
													4	91.0	K	M	2	2000	2.4													
79	5	ME3 238A4	F	N	8.6	Y	+12	+12	4147	70	30.18	58	3	88.0	K	M	3	1350	1.2	F				1	N	92.4	82.6	N				
													2	88.5	K	M	3	1300	1.2													
													4	87.0	K	M	3	1350	1.2													
124	32	MFF F50A4	F	N	8.4	Y	+18	+18	9782	70	29.48	51	3	91.0	K	M	4	1050	3.0	90.0	3	1200	1.0	1	N	91.7	82.5	B	K	3	1500	0.8
													2	90.0	K	M	4	1050	3.0													
													4	90.0	K	P	3	1300	1.0													
262	8	NAR F25A3	F	N	8.2	Y	+ 8	+ 8	13808	78	29.78	97	3	89.0	K	M	2	2700	1.0	F				1				N				
													2	90.0	K	M	2	2600	1.0													
													4	84.0	K	M	2	2600	1.0													
263	8	NAR F25A3	F	N	8.2	Y	+ 8	+ 8	16247	75	29.99	77	3	90.0	K	M	2	2600	1.0	F				1				B	K	2	2600	1.0
													2	91.0	K	M	2	2650	1.0													
													4	86.0	K	M	2	2600	1.0													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THR	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
10	29	NAX 228A3	F	N	8.5	Y	+10	+10	6010	70	29.92	62	3	90.0	K	M	3	2000	1.6	89.0	3	1900	6.0	1	N	92.3	83.8	B	K	3	1900	6.0
													2	93.0	K	M	3	2100	1.6													
													4	88.0	K	M	2	2300	0.9													
52	41	N/ ?28A3	C	N	8.5	Y	+10	+10	9892	72	29.93	68	3	88.0	K	M	2	2800	1.0	F				1				N				
													2	88.5	K	M	2	2600	1.0													
													4	86.0	K	M	2	2800	1.0													
185	6	NAX 228A3	F	N	8.5	Y	+10	+10	15030	52	30.50	33	3	100.0	K	P	3	1900	6.0	100.0	3	1900	6.0	1	N	97.0	86.4	B	K	3	2500	1.0
													2	101.0	K	P	3	1900	6.0													
													4	91.0	K	M	3	1600	2.0													
264	8	NAX 228A3	F	N	8.5	Y	+10	+10	11804	76	29.95	39	3	92.0	K	M	2	2700	1.0	92.0	3	1400	6.0	1				B	K	2	2700	1.0
													2	94.0	K	P	3	1550	6.0													
													4	88.0	K	M	3	1600	2.2													
80	5	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	8992	70	30.00	54	3	90.0	K	M	4	1100	1.8	88.0	4	1050	5.0	1								
													2	91.0	K	M	4	1100	1.8													
													4	88.0	K	M	4	1100	1.8													
129	23	NBH 450A4	F	N	8.6	Y	+ 8	+ 6	7745	68	28.43	102	3	91.0	K	M	4	1000	1.0	89.0	4	1000	2.0	1				B	K	4	1000	1.0
													2	91.0	K	M	3	1900	0.7													
													4	90.0	K	M	4	1000	1.0													
186	6	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	17584	68	30.24	52	3	91.5	K	M	4	1200	0.8	91.5	4	1200	1.0	1								
													2	92.0	K	M	2	3300	0.8													
													4	90.0	K	M	3	1900	0.4													
265	8	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	8758	70	30.35	29	3	89.0	K	M	2	2050	1.0	F				1				N				
													2	88.0	K	M	3	2050	2.0													
													4	85.0	K	M	3	2000	2.0													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THR	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWNK	TANK FUEL OCT NO RES	TANK FUEL OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
266	8	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	10180	86	29.64	107	3	88.0	K	M	2	2950	0.9	86.0	4	1200	3.5	1				N				
													2	90.0	K	M	2	3050	0.9													
													4	86.0	K	M	4	1150	2.5													
305	26	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	7522	75	30.25	92	3	92.0	S	M	4	1050	1.0	91.0	4	1100	3.0	1		91.3	82.6	N				
													2	91.0	B	M	4	1000	1.0													
													4	91.0	S	M	4	1100	1.0													
306	26	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	31958	78	29.98	86	3	88.0	K	M	4	1050	1.0	87.0	4	1200	2.0	1				N				
													2	88.0	K	M	4	1050	1.0													
													4	87.0	K	M	3	1850	1.0													
332	7	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	14761	72	30.36	56	3	91.0	K	M	4	1150	1.0	90.0	4	1150	2.0	1	N	91.4	83.2	A	K	3	2450	0.7
													2	92.0	K	M	4	1300	1.0													
													4	89.0	K	M	4	2050	0.8													
187	6	NB9 238A3	F	N	8.6	Y	0	0	7415	60	30.08	41	3	94.0	K	M	3	1800	0.6	91.0	3	1500	3.0	1								
													2	94.0	K	M	3	1250	1.8													
													4	92.0	K	M	3	1700	0.6													
130	23	NFH 450A4	F	N	8.6	Y	+ 6	+ 6	8882	54	28.47	60	3	91.0	K	M	4	1300	1.4	91.0	4	1100	2.4	1				B	K	4	1200	1.2
													2	94.0	K	M	2	3400	1.0													
													4	89.0	K	M	4	1500	1.2													
53	41	NF1 228A3	C	N	8.5	Y	+10	+10	12274	81	29.94	82	3	94.5	K	M	2	3250	1.0	92.0	3	3200	2.0	1				B	K	2	3250	1.0
													2	95.0	K	M	2	3250	1.0													
													4	92.0	K	M	2	3250	1.0													
81	5	NF1 228A3	F	N	8.5	Y	+10	+10	8596	70	28.85	52	3	98.0	K	M	3	1900	2.8	97.0	3	2000	5.0	1	O	93.6	83.9	A	K	3	1900	2.8
													2	100.0	K	M	3	1900	2.8													
													4	94.0	K	M	3	1900	2.8													

		VEHICLE DESCRIPTION									WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION							
														MAXIMUM						PART THROTTLE									RATER			
							SPARK ADVANCE																				OCT NO					
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
307	26	NF1 228A3	F	N	8.5	Y	+10	+10	18900	80	29.98	136	3	89.0	K	M	3	1550	2.0	86.0	3	1650	6.0	1		93.5	83.5	N				
													2	88.5	K	M	3	1650	2.0													
													4	88.0	K	M	3	1600	2.0													
333	7	NF1 228A3	F	N	8.5	Y	+10	+10	6998	70	30.52	62	3	96.0	K	M	3	2150	2.5	96.0	3	1850	3.0	1	N	92.0	82.4	A	K	3	2250	2.5
													2	98.0	K	P	3	2050	3.0													
													4	88.0	K	M	3	2200	2.5													
54	41	NGA 238A3	C	N	8.0	Y	+15	+15	9467	73	30.16	65	3	88.0	K	M	3	1700	0.8	F				1	N	94.0	84.1	N				
													2	89.0	K	M	3	1700	0.8													
													4	87.0	K	M	3	1700	0.8													
131	23	NG9 238A3	F	N	8.6	Y	0	0	9571	53	28.66	43	3	93.0	K	M	3	1700	2.0	93.0	3	1700	3.0	1				B	K	3	1700	2.0
													2	94.0	K	M	3	1700	2.0													
													4	91.0	K	M	3	1650	0.8													
188	6	NG9 238A3	F	N	8.6	Y	- 2	0	13660	64	30.00	54	3	97.0	K	M	3	1600	1.5	97.0	3	1700	3.0	1								
													2	98.0	K	M	3	1500	1.5													
													4	95.0	K	M	3	1600	0.6													
189	6	NG9 238A3	F	N	8.6	Y	0	0	6824	72	29.95	113	3	93.0	K	M	3	1500	3.2	92.0	3	1650	4.0	1	N	93.0	83.4	B	K	3	1300	3.2
													2	92.0	K	M	3	1500	3.2													
													4	91.0	K	M	3	1400	3.2													
190	6	NG9 238A3	F	N	8.6	Y	0	0	11980	77	29.80	110	3	92.0	K	M	3	1900	0.4	91.0	3	1600	3.0	1								
													2	92.0	K	M	3	1800	0.4													
													4	91.0	K	M	3	1800	0.4													
308	26	NG9 238A3	F	N	8.6	Y	0	0	21370	83	29.97	124	3	91.0	K	M	3	1775	1.0	F				1		91.8	82.1	N				
													2	91.0	K	M	2	1750	0.5													
													4	90.0	K	M	2	1650	0.5													

														OCTANE NUMBER REQUIREMENT DATA										TANK FUEL INFORMATION								
VEHICLE DESCRIPTION										WEATHER				MAXIMUM						PART THROTTLE								RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
309	26	NG9 238A3	F	N	8.6	Y	0	0	25110	84	30.16	116	3	90.0	K	M	3	1600	1.5	F				1		92.0	82.5	B	K	2	1600	0.5
													2	91.0	K	M	2	1600	0.5													
													4	90.0	K	M	2	1600	0.5													
310	26	NG9 238A3	F	N	8.6	Y	0	0	9945	80	30.04	116	3	95.0	K	M	3	1700	2.0	92.0	3	1650	3.0	1		95.7	84.8	B	K	3	1650	2.0
													2	96.0	K	M	2	1650	1.5													
													4	93.0	K	M	3	1750	1.0													
311	26	NG9 238A3	F	N	8.6	Y	0	0	19386	79	29.98	80	3	90.0	K	M	3	1600	0.8	F				1		92.0	82.3	N				
													2	89.0	K	M	3	1650	0.8													
													4	88.0	K	M	3	1650	0.8													
314	26	NG9 238A3	F	N	8.6	Y	0	0	4423	64	30.05	24	3	95.0	K	M	3	1750	0.7	94.0	3	1550	3.0	1		91.3	82.6	B	K	3	1700	2.4
													2	96.0	K	M	3	1750	0.7													
													4	93.0	K	M	3	1850	0.7													
11	29	NJP F20A3	F	N	9.3	Y	0	0	24870	70	29.91	60	3	95.0	K	M	3	2700	1.2	94.5	3	1600	6.0	1				A	K	3	2100	6.0
													2	97.0	K	M	3	2600	1.2													
													4	92.0	K	M	2	2800	0.7													
35	4	NJP F20A3	F	N	9.3	N	0	0	6327	88	29.09	65	3	100.0	K	P	3	1500	3.0	100.0	3	1500	3.0	1	D	91.6	82.1	A	K	2	2750	0.3
													2	H	K	P	3	1475	3.0													
													4	96.0	K	P	3	1500	3.0													
55	41	NJP F20A3	C	N	9.3	Y	0	0	7102	76	30.06	80	3	90.0	K	M	2	2900	0.5	F				1				N				
													2	90.0	K	M	2	2900	0.5													
													4	88.0	K	M	2	2900	0.5													
82	5	NJP F20A3	F	N	9.3	Y	0	0	6638	70	30.70	48	3	98.0	K	M	3	1800	2.0	98.0	3	1750	4.0	1	Y	95.0	85.0	A	K	3	2200	2.0
													2	100.0	K	M	3	1800	2.0													
													4	94.0	K	M	3	1700	2.0													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THR	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
83	5	NJP F20A3	F	N	9.3	Y	0	0	5016	70	30.10	58	3	99.0	K	M	3	1550	2.6	98.0	3	1600	4.0	1	O	92.2	82.3	A	K	3	1550	2.5
													2	100.0	K	M	3	1550	2.6													
													4	97.0	K	M	3	1550	2.6													
84	5	NJP F20A3	F	N	9.3	Y	0	0	9210	71	30.03	55	3	93.0	K	M	3	1900	2.0	92.0	3	1900	4.0	1	Y	94.0	83.4	A	K	3	2050	2.0
													2	94.0	K	M	3	1900	2.0													
													4	89.0	K	M	3	1850	2.0													
132	23	NJP F20A3	F	N	9.3	Y	0	0	9146	70	28.59	76	3	94.0	K	M	3	2800	0.5	92.0	3	1800	4.0	1				A	K	3	1650	3.0
													2	98.0	K	M	3	2800	0.5													
													4	91.0	K	M	3	2800	0.5													
191	6	NJP F20A3	F	N	9.3	Y	0	0	10069	75	29.90	97	3	95.0	K	M	3	2800	1.4	93.0	3	2000	3.2	1				B	K	3	2700	1.4
													2	96.0	K	M	3	2600	1.4													
													4	92.0	K	M	3	2800	1.4													
267	8	NJP F20A3	F	N	9.3	Y	0	0	7918	80	29.70	100	3	94.0	K	P	3	1700	3.0	94.0	3	1700	3.0	1				B	K	3	2700	1.0
													2	94.0	K	P	3	1550	3.0													
													4	87.0	K	M	2	2800	1.0													
268	8	NJP F20A3	F	N	9.3	Y	0	0	9984	71	29.87	43	3	92.0	K	P	3	1700	4.2	92.0	3	1700	4.2	1				B	K	2	3300	1.0
													2	92.0	K	P	3	1650	4.2													
													4	87.0	K	M	3	2800	1.0													
289	28	NJP F20A3	F	N	9.3	Y	0	0	12498	70	29.02	50	3	95.0	K	P	3	2150	2.0	95.0	3	2150	2.0	1				B	K	3	1900	2.0
													2	95.0	K	P	3	2200	2.0													
													4	92.0	K	P	3	2000	2.0													
290	28	NJP F20A3	F	N	9.3	Y	0	0	10482	70	29.25	50	3	95.0	K	M	3	2750	1.5	92.0	3	1800	4.0	1				A	K	3	1650	1.5
													2	97.0	K	M	3	2650	1.5													
													4	92.0	K	M	3	2650	1.5													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE						OCT NO		RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
291	28	NJP F20A3	F	N	9.3	Y	0	0	23841	70	29.23	50	3	98.0	K	M	3	2700	1.0	96.0	3	1450	5.0	1				A	K	3	2700	0.9
													2	99.0	K	M	3	2750	1.0													
													4	94.0	K	M	3	2600	1.0													
292	28	NJP F20A3	F	N	9.3	Y	0	0	15065	70	29.43	50	3	97.0	K	M	3	2700	1.5	94.0	3	2200	5.0	1	Y			B	K	3	2400	1.5
													2	100.0	K	M	3	2650	1.5													
													4	94.0	K	M	3	2700	1.5													
312	26	NJP F20A3	F	N	9.3	Y	0	0	12415	73	30.27	66	3	93.0	K	M	3	1700	1.0	91.0	3	1875	4.0	1		92.1	82.4	B	K	3	1875	1.0
													2	93.0	K	M	3	1875	1.0													
													4	92.0	K	M	3	2850	0.8													
313	26	NJP F20A3	F	N	9.3	Y	0	0	13910	82	29.81	108	3	94.0	K	M	3	1650	1.0	94.0	3	1700	2.0	1		93.5	82.8	N				
													2	94.0	K	M	3	1650	1.0													
													4	92.0	K	M	3	1850	1.0													
334	7	NJP F20A3	F	N	9.3	Y	0	0	8873	70	29.94	60	3	96.0	K	M	3	2000	0.7	94.0	3	1250	4.0	1	N	94.0	83.3	A	K	3	2000	0.7
													2	96.0	K	M	3	2000	0.7													
													4	92.0	K	M	3	2000	0.7													
85	5	NJP F20M4	F	N	9.3	Y	0	0	4014	69	29.90	50	3	90.0	K	M	3	1700	0.2	89.0	4	1300	5.0	1	N	95.8	86.2	N				
													2	90.0	K	M	3	1800	0.2													
													4	88.0	K	M	3	1550	0.2													
12	29	NTC 216A3	F	N	9.4	N	+ 6	+ 6	13066	72	30.22	65	3	90.0	K	M	3	1800	1.5	F				1	N			N				
													2	92.0	K	M	3	1800	1.5													
													4	88.0	K	M	3	1800	1.5													
13	29	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	6968	70	29.97	61	3	88.0	K	P	3	1500	5.0	88.0	3	1500	5.0	1				N				
													2	89.0	K	P	3	1550	5.0													
													4	87.0	K	P	3	1550	5.0													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
														MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKN	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
36	4	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	7004	81	29.33	97	3	84.0	K	M	2	2150	1.0	82.0	3	1875	3.5	1	N	96.2	85.9	N				
													2	84.0	K	M	3	1850	2.5													
													4	82.0	K	M	2	2000	1.0													
56	41	NTC 216A3	C	N	9.4	Y	+ 6	+ 6	11397	63	30.06	68	3	88.0	K	M	3	2700	1.8	F				1				N				
													2	89.0	K	M	3	2700	1.8													
													4	86.0	K	M	3	2650	1.8													
86	5	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	13865	70	29.92	54	3	90.5	K	M	2	2500	1.2	89.0	3	2100	3.8	1								
													2	91.0	K	M	2	2500	1.2													
													4	90.0	K	M	2	2500	1.2													
133	23	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	7416	46	28.48	30	3	90.0	K	M	2	2400	0.8	88.0	3	1900	3.0	1				N				
													2	90.0	K	M	3	1800	2.0													
													4	88.0	K	M	2	2400	0.8													
192	6	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	8370	77	30.11	78	3	93.0	K	M	3	2800	1.4	92.0	3	2400	2.5	1								
													2	94.0	K	M	3	2800	1.4													
													4	91.0	K	M	3	2800	1.5													
269	8	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	19864	80	29.86	41	3	86.0	K	M	3	1700	2.0	82.0	3	1900	3.0	1				N				
													2	87.0	K	M	3	1750	2.0													
													4	84.0	K	M	3	1750	2.0													
293	28	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	9624	70	29.53	50	3	86.0	K	M	3	2000	1.5	85.0	3	2000	3.0	1				N				
													2	86.0	K	M	3	2100	1.5													
													4	85.0	K	M	3	2300	1.5													
193	6	NTC 216M4	F	N	9.4	N	+ 8	+ 8	15091	68	29.91	78	3	92.0	K	M	4	2200	1.8	92.0	4	1900	2.0	1	N	92.6	82.7	B	K	3	1600	1.6
													2	92.0	K	M	4	1800	1.6													
													4	92.0	K	M	4	1900	1.6													

													OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION							
		VEHICLE DESCRIPTION								WEATHER				MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
194	6	NTC 216M4	F	N	9.4	N	+ 8	+ 8	9598	75	30.04	108	3	93.0	K	M	4	1800	1.2	93.0	4	1700	2.0	1	N	93.3	82.7	B	K	4	2000	1.2
													2	93.0	K	M	4	2500	1.2													
													4	92.0	K	M	4	1600	1.2													
57	41	NXR F25A3	C	N	8.2	Y	+ 8	+ 8	19885	77	30.06	83	3	98.0	K	M	2	2600	1.0	F				1				A	K	3	2600	1.0
													2	99.0	K	M	2	2600	1.0													
													4	96.0	K	M	2	2600	1.0													
240	46	NXR F25A3	F	N	8.2	Y	+ 2	+ 8	17990	75	29.49	82	3	92.0	K	M	3	2700	1.5					1				A	K	3	2700	1.5
													2	94.0	K	M	3	2650	1.5													
													4	90.0	K	M	3	2850	1.5													
270	8	NXR F25A3	F	N	8.2	Y	+ 8	+ 8	18157	76	29.72	90	3	87.0	K	M	2	2600	1.5	86.0	3	1850	4.0	1				N				
													2	90.0	K	M	2	2600	1.5													
													4	86.0	K	M	2	2600	1.5													
134	23	NXX 228A3	F	N	8.5	Y	+10	+10	6004	67	28.26	80	3	87.0	K	P	3	1200	6.0	87.0	3	1200	6.0	1				N				
													2	87.0	K	P	3	1200	6.0													
													4	85.0	K	M	3	1250	2.3													
195	6	NXX 228A3	F	N	8.5	Y	+10	+10	8308	77	30.25	73	3	97.0	K	P	3	1600	6.0	97.0	3	1600	6.0	1								
													2	98.0	K	P	3	1300	6.0													
													4	94.0	K	M	3	1600	2.0													
100	32	OA2 216A3	F	N	9.0	N	+10	+10	5456	70	29.42	53	3	92.0	K	M	3	1700	2.3	90.0	3	1700	2.8	1	N	90.8	82.9	B	K	3	1800	1.6
													2	92.0	K	M	3	1700	2.4													
													4	91.0	K	M	3	1750	2.2													
101	32	OA2 216A3	F	N	9.0	N	+10	+10	9414	70	29.63	50	3	94.0	K	P	3	1600	2.0	94.0	3	1600	2.0	1	N	90.8	84.3	B	K	3	1500	2.0
													2	91.0	K	P	3	1700	2.0													
													4	91.0	K	P	3	1500	2.0													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
													MAXIMUM							PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
167	8	0A2 216A3	F	N	9.0	Y	+16	+10	8705	73	30.09	70	3	89.0	K	M	3	1400	0.4	89.0	3	1400	0.6	1	N	97.2	88.0	N				
													2	88.0	K	M	3	1600	0.4													
													4	88.0	K	M	3	1700	0.4													
236	46	0A2 216A3	F	N	9.0	Y	+10	+10	12550	74	29.15	64	3	90.0	K	M	3	2000	1.0	F				1				N				
													2	90.0	K	M	3	2000	1.0													
													4	89.0	K	M	3	2100	1.0													
329	7	0A2 216A3	F	N	9.0	Y	+10	+10	18173	72	30.23	65	3	93.0	K	P	3	1950	2.0	93.0	3	1950	2.0	1	N	91.8	82.8	A	K	3	2500	0.9
													2	94.0	K	M	3	2500	0.9													
													4	92.0	K	M	3	2400	0.9													
102	32	0A2 216M4	F	N	9.0	Y	+ 8	+ 8	18366	70	29.54	50	3	88.0	K	P	4	1500	1.0	88.0	4	1500	1.0	1	N	91.8	83.2	N				
													2	86.0	K	M	4	1800	0.3													
													4	88.0	K	P	4	1500	1.0													
103	32	0A2 216M4	F	N	9.0	N	+ 8	+ 8	7780	70	29.27	57	3	93.0	K	M	3	1300	0.2	91.0	4	1200	2.0	1	N	91.8	83.0	B	K	3	1100	0.2
													2	91.0	K	M	4	1500	0.2													
													4	91.0	K	M	4	1400	0.2													
168	6	0A2 216M4	F	N	9.0	Y	+ 8	+ 8	12169	79	30.04	90	3	90.0	K	M	4	1900	0.4	90.0	4	1800	0.6	1								
													2	89.0	K	M	4	1800	0.4													
													4	89.0	K	M	4	1900	0.4													
6	29	0A4 216A3	F	N	9.0	Y	+14	+14	10695	70	30.07	58	3	95.0	K	M	3	1000	1.2	95.0	3	1100	3.0	1				A	K	3	1100	1.2
													2	94.5	K	M	3	1100	1.2													
													4	95.0	K	M	3	1150	1.2													
34	4	0A4 216A3	F	N	9.0	Y	+14	+14	5302	79	29.32	102	3	88.0	K	M	2	1850	0.4	87.0	3	1350	2.0	1	N	97.2	85.7	N				
													2	88.0	K	M	3	1850	0.7													
													4	88.0	K	M	3	2050	0.7													

		VEHICLE DESCRIPTION							WEATHER				OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
													MAXIMUM							PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	DWNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
48	41	0A4 216A3	C	N	9.0	Y	+14	+14	6178	74	30.05	69	3	91.5	K	M	3	1800	1.5	F				1				B	K	3	1800	1.5
													2	93.0	K	M	3	1800	1.5													
													4	91.0	K	M	3	1800	1.5													
76	5	0A4 216A3	F	N	9.0	Y	+14	+14	7161	70	30.30	52	3	92.0	K	M	3	1300	3.0	91.0	3	1300	4.0	1	Y	92.2	82.8	B	K	3	1350	3.0
													2	93.0	K	M	3	1350	3.0													
													4	92.0	K	M	3	1900	3.0													
77	5	0A4 216A3	F	N	9.0	Y	+14	+14	5896	70	30.00	54	3	97.0	K	P	3	1700	7.0	97.0	3	1700	7.0	1	N	93.0	82.4	A	K	3	2100	0.6
													2	98.0	K	P	3	1850	6.0													
													4	94.0	K	P	3	1800	3.0													
104	32	0A4 216A3	F	N	9.0	Y	+14	+14	10968	70	29.68	50	3	91.0	K	P	3	1300	2.0	91.0	3	1300	2.0	1	N	90.9	82.9	B	K	3	1300	2.0
													2	90.0	K	P	3	1300	2.0													
													4	89.0	K	M	3	2400	0.6													
105	32	0A4 216A3	F	N	9.0	Y	+14	+14	8642	70	29.34	49	3	90.0	K	M	3	1300	1.6	90.0	3	1300	3.0	1	N	91.3	82.5	N				
													2	90.0	K	M	2	1850	0.4													
													4	89.0	K	M	3	1800	1.2													
169	6	0A4 216A3	F	N	9.0	Y	+14	+14	7320	55	29.65	28	3	94.0	K	M	3	1500	3.2	93.0	3	1500	3.8	1								
													2	94.0	K	M	3	1500	3.2													
													4	93.0	K	M	3	1900	3.0													
170	6	0A4 216A3	F	N	9.0	Y	+14	+14	7144	65	30.20	33	3	92.0	K	M	3	2000	1.5	91.0	3	1900	3.0	1								
													2	91.0	K	M	3	1800	1.6													
													4	92.0	K	M	3	2000	1.6													
171	6	0A4 216A3	F	N	9.0	Y	+14	+14	6540	82	30.11	70	3	94.0	K	M	3	1200	1.0	94.0	3	1200	2.0	1								
													2	95.0	K	M	3	2200	0.4													
													4	93.0	K	M	3	1200	1.0													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THER	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
257	8	0A4 216A3	F	N	9.0	N	+14	+14	21081	70	29.66	53	3	92.0	K	M	3	1500	1.8	91.0	3	1300	4.0	1				B	K	3	1450	1.8
													2	94.0	K	M	3	1350	1.8													
													4	90.0	K	M	3	1550	1.8													
285	28	0A4 216A3	F	N	9.0	Y	+14	+14	11785	70	29.51	50	3	87.0	K	M	3	1400	2.0	86.0	3	1400	3.0	1				N				
													2	88.0	K	M	3	1500	2.0													
													4	87.0	K	M	3	1300	2.0													
330	7	0A4 216A3	F	N	9.0	Y	+14	+14	8777	71	30.40	61	3	94.0	K	M	2	2750	0.3	90.0	3	2050	2.0	1	N	91.6	82.5	A	K	2	3600	0.3
													2	94.0	K	M	3	2650	0.4													
													4	92.0	K	M	2	3150	0.3													
49	41	0A4 216M5	C	N	9.0	Y	+12	+12	6236	71	30.04	69	3	90.0	K	M	4	2150	0.4	F				1	N	93.0	82.9	N				
													2	91.0	K	M	4	2150	0.4													
													4	89.0	K	M	4	2150	0.4													
106	32	0A4 216M5	F	N	9.0	Y	+14	+10	10407	70	29.29	51	3	91.0	K	P	4	3400	1.0	91.0	4	3400	1.0	1								
													2	90.0	K	P	4	3400	1.0													
													4	90.0	K	P	4	2000	1.0													
7	29	0A5 F16M5	F	N	9.0	Y	+15	+15	23831	70	29.91	60	3	99.0	K	P	4	1900	3.0	99.0	4	1900	3.0	1				A	K	4	1600	3.0
													2	98.0	K	P	4	1900	3.0													
													4	91.0	K	M	4	1600	0.1													
172	6	0A5 F16M5	F	N	9.0	Y	+15	+15	8828	52	30.53	24	3	94.0	K	M	4	2000	0.4	93.0	4	2000	3.0	1	N	97.1	86.6	N				
													2	96.0	K	M	4	2800	0.4													
													4	94.0	K	M	4	2100	0.4													
286	28	0A5 F16M5	F	N	9.0	Y	+10	+10	10341	70	29.36	50	3	87.0	K	M	4	1700	1.0	85.5	4	1825	3.0	1				N				
													2	86.0	K	M	4	2100	1.0													
													4	86.0	K	M	4	1850	1.0													

VEHICLE DESCRIPTION										WEATHER			OCTANE NUMBER REQUIREMENT DATA: MAXIMUM							PART THROTTLE				TANK FUEL INFORMATION				RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
287	28	0A5 F16M5	F	N	9.0	Y	+15	+15	9540	70	29.29	50	3	88.0	K	M	4	1800	1.0	87.0	4	1600	3.0	1				N				
													2	90.0	K	M	4	1750	1.0													
													4	88.0	K	M	4	1750	1.0													
173	6	0BA 123A3	F	N	9.0	N	+10	+ 9	6082	79	29.80	101	3	88.5	K	M	3	2400	1.4	88.0	3	2400	2.5	1	0	97.2	86.0	N				
													2	89.0	K	M	3	2000	1.4													
													4	87.0	K	M	3	2400	1.4													
107	32	0BA 123M4	F	N	9.0	Y	+ 5	+ 9	6912	70	29.62	51	3	94.0	K	M	4	2100	0.7	93.0	4	1700	1.5	1								
													2	94.0	K	M	4	1800	0.7													
													4	94.0	K	M	4	1800	0.7													
108	32	0BH 450M5	A	N	8.3	Y	+12	+10	12045	70	29.54	53	3	86.0	K	M	3	1600	0.8	86.0	4	1600	1.0	1	N	90.3	83.0	N				
													2	87.0	K	M	3	2600	0.8													
													4	86.0	K	M	3	2000	0.8													
174	6	0B3 238A3	F	N	8.6	Y	+10	+10	9712	81	29.90	104	3	88.0	K	M	3	2000	1.0	88.0	3	2000	1.6	1								
													2	89.0	K	M	2	1700	0.6													
													4	87.0	K	M	3	2100	1.0													
302	26	0CX 133A3	F	N	8.6	Y	+10	+10	9314	74	30.17	104	3	90.0	K	M	2	1600	0.6	88.0	3	1925	1.5	1		91.3	82.3	N				
													2	90.0	K	M	3	1925	0.9													
													4	89.0	K	M	3	1600	0.9													
109	32	0DF F50A4	F	N	8.4	Y	+20	+20	8825	71	29.13	58	3	88.0	K	M	3	2400	1.0	87.0	4	1400	1.0	1	N	91.2	83.0	N				
													2	87.0	K	M	3	2600	1.0													
													4	86.0	K	M	3	2100	0.8													
50	41	0D3 238A3	C	N	8.6	Y	+10	+10	13942	83	29.97	68	3	90.0	K	M	2	2750	1.0	F				1				N				
													2	90.0	K	M	2	2750	1.0													
													4	89.5	K	M	2	2750	1.0													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE								RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
78	5	OD3 238A3	F	N	8.6	Y	+10	+10	10685	70	30.10	54	3	90.0	K	M	2	1700	0.8	F				1								
													2	91.0	K	M	2	1800	0.8													
													4	89.0	K	M	2	1800	0.8													
175	6	OD3 238A3	F	N	8.6	Y	+10	+10	8400	77	30.25	73	3	91.0	K	M	3	1800	1.5	91.0	3	1900	1.7	1	0	93.0	82.7	N				
													2	91.0	K	M	3	1800	1.5													
													4	90.0	K	M	3	1900	1.5													
176	6	OD3 238A3	F	N	8.6	Y	+10	+10	6720	88	29.84	110	3	93.0	K	P	3	1500	4.0	93.0	3	1500	4.0	1								
													2	93.0	K	P	3	1500	4.0													
													4	91.0	K	M	2	1600	1.4													
237	46	OD3 238A3	F	N	8.6	Y	+12	+10	6219	77	29.22	99	3	79.0	K	M	3	2000	1.5	78.0	3	1900	3.5	1				N				
													2	80.0	K	M	3	2000	1.5													
													4	78.0	K	M	3	2050	1.5													
110	32	OD3 238A4	F	N	8.6	Y	+12	+12	4870	70	29.63	50	3	92.0	K	M	3	1000	1.4	F				1	Y	90.6	85.1	N				
													2	93.0	K	M	3	1000	1.4													
													4	93.0	K	M	3	1000	1.4													
111	32	OD3 238A4	F	N	8.6	Y	+12	+12	10248	70	29.20	55	3	90.0	K	P	3	1200	1.0	90.0	3	1200	1.0	1	N							
													2	89.0	K	P	3	1200	1.0													
													4	89.0	K	P	3	1200	1.0													
112	32	OEX 133A3	F	N	8.6	Y	+10	+10	4785	70	29.28	54	3	91.0	K	M	2	1800	0.8	F				1	N	91.3	82.6	B	K	2	1900	0.8
													2	91.0	K	M	2	1850	0.8													
													4	90.0	K	M	2	1850	0.8													
113	32	OEX 133A3	F	N	8.6	Y	+10	+10	9421	70	29.06	72	3	90.0	K	M	2	1600	0.5	F				1	N	91.4	82.6	B	K	2	1700	0.5
													2	90.0	K	M	2	1600	0.5													
													4	90.0	K	M	2	1600	0.5													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
														MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
114	32	OEX 133A3	F	N	8.6	Y	+10	+10	7379	70	29.56	53	3	92.0	K	M	3	2150	1.2	91.0	3	2200	1.5	1	Y	91.0	82.6	N				
													2	87.5	K	M	3	2050	1.4													
													4	88.0	K	M	3	2100	1.2													
258	8	OEX 133A3	F	N	8.6	Y	+10	+10	11609	80	30.31	37	3	95.0	K	M	2	2000	0.9	F				1				A	K	2	2100	0.9
													2	96.0	K	M	2	2100	0.9													
													4	91.0	K	M	2	2050	0.9													
9	29	OE3 238A3	F	N	8.6	Y	+12	+12	13056	72	30.22	65	3	88.0	K	M	2	1650	1.0	87.0	3	1750	3.5	1	N			N				
													2	91.0	K	M	2	1650	1.0													
													4	87.0	K	M	3	1600	1.2													
51	41	OE3 238A3	C	N	8.6	Y	+16	+10	21297	70	30.02	61	3	87.5	K	M	2	1600	0.6	F				1				N				
													2	89.0	K	M	2	1600	0.6													
													4	86.0	K	M	2	1600	0.6													
177	6	OE3 238A3	F	N	8.6	Y	+10	+10	10437	89	29.84	115	3	89.0	K	M	3	2000	0.4	89.0	3	2000	0.6	1								
													2	89.0	K	M	3	2000	0.4													
													4	89.0	K	M	3	2000	0.4													
259	8	OE3 238A3	F	N	8.6	Y	+12	+12	17128	74	29.98	69	3	86.0	K	M	3	1300	1.5	86.0	3	1250	2.2	1				N				
													2	88.0	K	M	3	1350	1.5													
													4	82.0	K	M	3	1350	1.5													
8	29	OE3 238A4	F	N	8.6	Y	+12	+12	12617	70	30.06	62	3	88.0	K	P	4	1250	6.0	88.0	4	1250	6.0	1				N				
													2	87.0	K	P	4	1300	6.0													
													4	86.0	K	P	4	1200	6.0													
115	32	OE3 238A4	F	N	8.6	Y	+12	+12	9640	70	29.57	50	3	90.0	K	P	4	1250	3.0	90.0	4	1250	3.0	1	Y	91.5	84.5	N				
													2	86.0	K	M	2	2500	1.2													
													4	87.0	K	P	4	1250	3.0													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE						OCT NO		RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
116	32	OE3 238A4	F	N	8.6	Y	+12	+12	11156	70	29.88	50	3	87.0	K	P	4	1350	3.0	87.0	4	1350	3.0	1	N	90.8	84.0	N				
													2	86.0	K	M	3	1300	0.9													
													4	86.0	K	M	2	2650	0.9													
178	6	OE3 238A4	F	N	8.6	Y	+12	+12	17384	79	30.27	75	3	95.0	K	P	4	1300	3.0	95.0	4	1300	3.0	1	Y	93.1	82.7	A	K	4	1400	3.5
													2	96.0	K	P	4	1300	3.0													
													4	91.0	K	M	3	2300	0.8													
238	46	OE3 238A4	F	N	8.6	Y	+12	+12	7661	74	29.30	104	3	84.0	K	M	2	2800	2.5	84.0	4	2800	3.0	1	N			N				
													2	86.0	K	M	2	3100	2.5													
													4	82.0	K	M	2	2500	2.5													
288	28	OE3 238A4	F	N	8.6	Y	+12	+12	15266	70	29.53	50	3	90.0	K	M	4	1450	1.0	88.0	4	1400	3.0	1				N				
													2	90.0	K	M	4	1400	1.0													
													4	90.0	K	M	4	1400	1.0													
303	26	OE3 238A4	F	N	8.6	Y	+12	+12	4823	68	29.77	56	3	91.0	K	M	3	950	1.0	F				1		91.2	82.6	B	K	4	1400	1.0
													2	93.0	K	M	3	950	1.0													
													4	88.0	K	M	4	1400	1.5													
331	7	OE3 238A4	F	N	8.6	Y	+ 8	+12	9104	70	30.41	59	3	92.0	K	P	4	1650	3.0	92.0	4	1650	3.0	1								
													2	94.0	K	M	2	2500	1.9													
													4	90.0	K	M	3	2000	0.8													
37	4	OFF F50A4	F	N	8.4	Y	+20	+20	6726	77	29.35	64	3	93.0	K	M	2	2200	0.5	90.0	4	1150	2.0	1	N	92.2	83.0	B	K	2	2250	0.5
													2	93.0	K	M	2	2400	0.5													
													4	92.0	K	M	3	1800	0.5													
304	26	OFF F50A4	F	N	8.4	Y	+20	+20	6865	87	29.97	124	3	90.0	K	M	3	1100	0.6	89.0	4	1100	1.4	1		91.3	82.6	N				
													2	90.0	K	M	3	1150	0.6													
													4	89.0	K	M	4	1150	0.6													

			VEHICLE DESCRIPTION							WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
														MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	DWNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
4	29	PKC 222A3	F	N	9.0	Y	+10	+10	16555	72	30.32	63	3	93.0	K	P	3	1650	4.0	93.0	3	1650	4.0	1				A	K	3	1500	4.0
													2	96.0	K	P	3	1650	4.0													
													4	90.0	K	M	2	1750	0.7													
46	41	PKC 222A3	C	N	9.0	Y	+10	+10	18687	72	30.00	72	3	88.0	K	M	2	2400	0.8	F				1				N				
													2	89.0	K	M	2	2400	0.8													
													4	87.0	K	M	2	2400	0.8													
47	41	PKC 222A3	C	N	9.0	Y	+ 8	+10	9075	74	30.08	78	3	91.0	K	M	2	2100	1.2	F				1				N				
													2	91.0	K	M	2	2100	1.2													
													4	89.0	K	M	2	2100	1.2													
74	5	PKC 222A3	F	N	9.0	Y	+10	+10	8945	70	29.93	54	3	87.0	K	M	3	1650	3.0	87.0	3	1900	5.0	1								
													2	89.0	K	P	3	1900	5.0													
													4	85.0	K	M	3	1900	3.0													
157	6	PKC 222A3	F	N	9.0	Y	+10	+10	11924	74	29.82	121	3	96.0	K	P	3	2300	5.0	96.0	3	2300	5.0	1	Y	93.0	82.7	N				
													2	97.0	K	P	3	1800	5.0													
													4	91.0	K	M	2	2000	0.4													
253	8	PKC 222A3	F	N	9.0	Y	+10	+10	19709	70	29.62	36	3	92.0	K	M	3	1950	2.5	92.0	3	1850	4.0	1				B	K	3	2000	2.5
													2	94.0	K	M	3	1950	2.5													
													4	84.0	K	M	3	2000	2.5													
254	8	PKC 222A3	F	N	9.0	Y	+10	+10	16103	74	29.75	60	3	90.0	K	M	3	1950	2.0	90.0	3	1650	4.5	1				N				
													2	92.0	K	P	3	1800	4.5													
													4	86.0	K	M	3	1950	2.0													
300	26	PKC 222A3	F	N	9.0	Y	+10	+10	18146	80	30.07	84	3	89.0	K	P	3	1700	3.0	89.0	3	1700	3.0	1		92.0	82.1	B	K	3	1650	1.5
													2	91.0	K	P	3	1650	3.0													
													4	87.0	K	P	3	1700	3.0													

			VEHICLE DESCRIPTION							WEATHER			OCTANE NUMBER REQUIREMENT DATA												TANK FUEL INFORMATION							
							SPARK ADVANCE							MAXIMUM						PART THROTTLE								RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
327	7	PKC 222A3	F	N	9.0	Y	+10	+10	11570	70	30.14	56	3	94.0	K	M	3	2450	0.7	94.0	3	2450	6.0	1								
													2	98.0	K	P	3	2500	6.0													
													4	92.0	K	M	3	2500	0.7													
158	6	PKC 222M4	F	N	9.0	Y	+10	+10	15833	48	29.77	43	3	100.0	K	P	4	1800	4.0	100.0	4	1800	4.0	1	0	94.4	84.1	A	K	4	2000	4.0
													2	H	K	P	4	1700	4.0													
													4	94.0	K	M	4	1300	0.4													
357	31	PKC 222M4	F	N	9.0	N	+10	+10	5757	77	29.10	112	3	88.0	K	M	3	1000	1.8	84.0	3	1000	4.0	1								
													2																			
													4																			
358	31	PKC 222M5	F	N	9.0	Y	+10	+10	8252	80	28.80	108	3	84.0	K	M	4	1000	1.8	84.0	4	950	4.0	1								
													2																			
													4																			
5	29	PLC 222A3	F	N	9.0	Y	+10	+10	10413	70	30.32	58	3	96.0	K	M	3	1600	1.5	96.0	3	1600	4.5	1				A	K	3	1500	4.5
													2	97.5	K	P	3	1700	4.5													
													4	89.0	K	M	2	1800	0.9													
31	4	PLC 222A3	F	N	9.0	Y	+10	+10	6434	73	29.30	66	3	94.0	K	P	3	1700	4.0	94.0	3	1700	4.0	1	N	91.9	82.6	A	K	3	1850	4.0
													2	96.0	K	P	3	1750	4.0													
													4	90.0	K	M	2	1800	1.2													
160	6	PLC 222A3	F	N	9.0	Y	+10	+10	15049	60	30.08	41	3	97.0	K	P	3	2200	5.0	97.0	3	2200	5.0	1	0	93.4	83.5	A	K	3	2200	5.0
													2	H	K	P	3	2200	5.0													
													4	92.0	K	M	2	2200	1.4													
159	6	PLC 222M5	F	N	9.0	N	+10	+10	8463	88	29.84	110	3	91.0	K	P	4	2000	7.0	91.0	4	2000	7.0	1	N	93.5	84.8	B	K	4	1800	6.0
													2	96.0	K	P	4	2000	7.0													
													4	89.0	K	M	4	1700	2.2													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THER	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
2	29	RA6 F14A3	F	N	8.8	Y			17802	70	30.29	58	3	94.0	K	M	3	2500	0.7	F				1				A	K	3	2300	0.7
													2	95.5	K	M	3	2300	0.7													
													4	92.0	K	M	3	2300	0.7													
45	41	RA6 F14A3	C	N	8.8	Y			15197	72	30.06	67	3	88.0	K	M	2	3250	0.8	F				1				N				
													2	89.0	K	M	2	3250	0.8													
													4	86.0	K	M	2	3250	0.8													
155	6	RA6 F14A3	F	N	8.8	Y	+ 8	+ 8	10649	76	30.16	75	3	90.0	K	M	3	2900	0.6	89.0	3	2700	3.0	1								
													2	91.0	K	M	3	2900	0.6													
													4	89.0	K	M	3	2800	0.6													
251	8	RA6 F14A3	F	N	8.8	Y			6456	72	29.31	23	3	87.0	K	M	2	3150	0.5	84.0	3	2100	3.0	1				N				
													2	88.0	K	M	2	3100	0.5													
													4	86.0	K	M	2	3000	0.5													
281	28	RA6 F14A3	F	N	8.8	Y			10449	70	29.16	50	3	86.0	K	M	3	2300	1.0	84.0	3	2150	3.0	1				N				
													2	88.0	K	M	3	2300	1.0													
													4	85.5	K	M	3	2200	1.0													
282	28	RA6 F14A3	F	N	8.8	Y			10615	70	29.30	50	3	89.0	K	M	3	2400	1.5	87.0	3	2000	5.0	1				N				
													2	90.0	K	M	3	2400	1.5													
													4	86.0	K	M	3	2000	1.5													
156	6	RA6 F14M5	F	N	8.8	Y	+ 8	+ 8	11419	63	30.26	40	3	92.0	K	M	4	1900	0.4	92.0	4	1900	4.0	1	0	92.9	83.3	A	K	3	4000	0.4
													2	94.0	K	M	3	3800	1.3													
													4	91.0	K	M	4	1800	0.4													
283	28	RA6 F14M5	F	N	8.8	Y			17701	70	29.32	50	3	90.0	K	M	4	1850	0.5	88.0	4	1800	2.0	1				N				
													2	90.0	K	M	4	1950	0.5													
													4	90.0	K	M	4	1700	0.5													

			VEHICLE DESCRIPTION							WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION							
							SPARK ADVANCE							MAXIMUM						PART THROTTLE								RATER			
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
363	40	RA6 F14M5	A	N	8.8	N			9020	44	29.76	21	3	95.0	K	M	3	3600	0.0					1				B	K	3	3500	0.0
													2	96.0	K	M	3	3500	0.0													
													4	92.0	K	M	3	3000	0.0													
364	40	RA6 F14M5	A	N	8.8	N			22500	60	29.98	90	3	93.5	K	M	4	2000	0.0	92.5	4	2400	3.0	1				A	K	3	4200	0.0
													2	97.5	K	M	3	4100	0.0													
													4	92.5	K	M	4	2000	0.0													
3	29	RC5 242A3	F	N	9.2	Y	+ 6	+ 6	20000	70	29.92	60	3	94.0	K	M	3	1700	0.6	94.0	3	1700	6.0	1	O	92.7	84.0	A	K	3	1600	6.0
													2	97.0	K	M	2	1950	0.8													
													4	94.0	K	M	3	1600	0.6													
252	8	RC5 242A3	F	N	9.2	Y	+ 6	+ 6	20674	70	30.10	40	3	91.0	K	M	3	1600	0.9	F				1				B	K	3	1500	0.9
													2	92.0	K	M	3	1700	0.9													
													4	89.0	K	M	3	1500	0.9													
125	32	SGF F50A4	F	N	8.4	Y	+20	+20	13682	70	29.32	50	3	87.0	K	M	3	2400	1.5	86.0	4	1200	3.0	1	N	91.2	83.0	N				
													2	89.0	K	M	3	2300	1.5													
													4	87.0	K	M	3	1500	1.5													
183	6	SHF F50A4	F	N	8.4	Y	+20	+20	14600	77	30.02	64	3	93.0	K	M	4	1000	0.4	92.0	4	1000	1.5	1								
													2	92.0	K	M	4	1000	0.4													
													4	93.0	K	M	4	1050	0.4													
184	6	SHF F50A4	F	N	8.4	Y	+20	+20	9791	64	29.81	50	3	92.0	K	M	3	1800	1.5	90.0	4	1200	3.8	1				N				
													2	92.0	K	M	3	1700	1.4													
													4	91.0	K	M	3	1700	1.4													
64	41	NTLH 450A3	C	N	8.6	Y	+ 4	+ 6	9487	90	29.97	30	3	94.0	K	M	2	2200	1.0	F				1	Y	92.3	83.0	A	K	2	2200	1.0
													2	95.5	K	M	2	2200	1.0													
													4	92.0	K	M	2	2200	1.0													

VEHICLE DESCRIPTION										WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
													MAXIMUM							PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
152	23	NTSA 219M4	F	N	8.5	N	+ 8	+ 6	6615	81	28.75	64	3	89.0	K	M	4	1200	0.7	89.0	4	1200	2.0	1				N				
													2	90.0	K	M	4	1200	0.7													
													4	91.0	K	M	4	1200	0.7													
341	7	NTSB 228A3	F	N	8.5	Y	+12	+12	8049	71	30.32	60	3	96.0	K	M	3	1250	1.8	95.0	3	1250	6.0	1				A	K	3	1900	1.8
													2	98.0	K	M	3	1850	1.8													
													4	95.0	K	M	3	1250	1.8													
153	23	NTSB 228A4	F	N	8.5	Y	+12	+12	10365	49	28.40	41	3	92.0	K	M	4	1200	2.0	90.0	4	1200	3.0	1				B	K	4	1200	2.0
													2	93.0	K	M	4	1200	2.0													
													4	91.0	K	M	4	1200	2.0													
154	23	NTSB 228M5	F	N	8.5	Y	+ 7	+ 8	44293	57	28.78	35	3	92.0	K	M	4	1300	0.2	91.0	4	1200	1.0	1				B	K	4	1300	0.2
													2	92.0	K	M	4	1300	0.2													
													4	92.0	K	M	4	1300	0.2													
42	4	OTLA 123A3	F	N	9.0	N	+ 8	+ 8	8068	78	29.16	82	3	89.0	K	M	3	2800	1.3	87.0	3	2200	8.0	1	N	90.0	82.9	B	K	3	2850	1.3
													2	89.0	K	M	3	2550	1.3													
													4	88.0	K	M	3	2750	1.3													
126	32	OTLA 123A3	F	N	9.0	Y	+ 4	+ 8	11119	70	29.62	50	3	89.0	K	M	3	2800	1.9	F				1								
													2	89.0	K	M	3	3000	1.9													
													4	88.0	K	M	3	2900	1.9													
340	7	OTLY 149A3	F	N	8.9	N	+14	+10	5036	71	30.28	57	3	93.0	K	M	3	2250	1.9	F				1								
													2	94.0	K	M	3	2350	1.9													
													4	91.0	K	M	3	2250	1.9													
321	26	OTMG V258A3F	N		8.3	Y	+19	+19	10411	79	29.98	138	3	90.0	K	M	3	2200	1.0	F				1		92.0	82.5	N				
													2	92.0	K	M	2	2900	2.0													
													4	89.0	K	M	2	2900	2.0													

			VEHICLE DESCRIPTION							WEATHER			OCTANE NUMBER REQUIREMENT DATA												TANK FUEL INFORMATION							
							SPARK ADVANCE							MAXIMUM						PART THROTTLE								RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THER	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
63	41	DTMY 149M4	C	N	8.9	N			7527	72	30.00	72	3	91.0	K	M	4	1600	0.4	F				1	N			N				
													2	92.0	K	M	4	1600	0.4													
													4	91.0	K	M	4	1600	0.4													
91	5	OVHG V258A3F	N		8.3	Y	+ 8	+ 8	5029	75	29.90	56	3	91.0	K	M	2	1900	1.0	90.0	3	1650	5.8	1								
													2	92.0	K	M	2	1900	1.0													
													4	90.0	K	M	2	1900	1.0													
92	5	OVMI 250A4	F	N	8.4	Y	+ 8	+ 8	10239	72	30.00	82	3	91.5	K	M	4	1300	2.0	91.5	4	1300	3.0	1	N	96.8	86.0	N				
													2	92.0	K	M	4	1300	2.0													
													4	91.5	K	M	4	1300	2.0													
127	32	OVMI 250A4	F	N	8.4	Y	+ 8	+ 8	5254	70	29.61	50	3	92.0	K	M	3	1100	1.2	92 0	3	1200	3.0	1	N	93.6	84.5	N				
													2	92.0	K	P	3	1200	3.0													
													4	92.0	K	M	3	1100	1.2													
128	32	OVMI 250A4	F	N	8.4	Y	+ 8	+ 8	16991	70	29.55	50	3	92.0	K	M	4	1400	0.8	92.0	4	1350	1.2	1	Y	91.3	84.3	B	K	3	1400	1.2
													2	93.0	K	M	4	1500	0.8													
													4	93.0	K	M	4	1400	0.8													
93	5	C 216M4	F	N	8.5	Y	+ 5	+ 5	32015	69	30.62	50	3	90.0	K	M	4	1400	1.0	F				1								
													2	92.0	K	M	4	1300	1.0													
													4	92.0	K	M	4	1400	1.0													
342	7	CP 222M5	F	N	9.0	N	+ 8	+10	6177	70	30.10	61	3	92.0	K	M	4	1900	0.2	90.0	4	1750	4.0	1	N	93.2	83.2	A	K	4	2600	4.0
													2	93.0	K	M	4	1850	0.2													
													4	91.0	K	M	3	1900	0.3													
213	6	E 216A3	F	N	9.4	Y	+ 5	+ 5	16566	77	29.80	110	3	89.0	K	M	3	2800	1.4	88.0	3	2300	2.4	1								
													2	89.0	K	M	3	3000	1.4													
													4	89.0	K	M	3	2100	1.4													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THR	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
322	26	E 216A3	F	N	9.4	Y	- 5	- 5	8494	85	29.95	88	3	90.0	B	M	3	2600	1.0	F				1		91.3	82.6	B	B	3	2650	1.0
													2	91.0	K	M	3	2250	1.0													
													4	91.0	B	M	3	2150	1.0													
343	7	E 216A3	F	N	9.4	Y	+ 5	+ 5	5886	72	29.90	58	3	88.0	K	M	3	3200	1.2	87.0	3	2400	2.0	1	N	93.2	83.0	N				
													2	90.0	K	M	3	3200	1.2													
													4	89.0	K	M	3	2250	1.2													
18	29	E 216M5	F	N	9.4	Y	+ 5	+ 5	9646	70	30.32	58	3	98.0	K	M	3	600	0.1	98.0	4	600	2.0	1	N	92.4	83.9	A	K	4	600	2.0
													2	97.0	K	M	4	650	0.1													
													4	98.0	K	M	3	650	0.1													
19	29	E 216M5	F	N	9.4	Y	+ 5	+ 5	7688	70	29.92	62	3	96.5	K	P	4	850	2.0	96.5	4	850	2.0	1	N	91.5	83.5	A	K	4	700	2.0
													2	96.0	K	P	4	850	2.0													
													4	97.5	K	P	4	800	2.0													
65	41	E 216M5	C	N	9.4	N	- 2	- 2	21974	72	29.94	67	3	95.0	K	M	4	1750	0.8	F				1	Y	92.9	82.9	A	K	4	1750	0.8
													2	96.5	K	M	4	1750	0.8													
													4	94.0	K	M	4	1750	0.8													
214	6	E 216M5	F	N	9.4	N	+ 5	+ 5	6293	80	29.87	112	3	93.0	K	M	4	1500	0.6	93.0	4	1500	0.8	1	N	93.0	82.3	N				
													2	92.0	K	M	4	1900	0.6													
													4	93.0	K	M	4	1600	0.6													
215	6	E 216M5	F	N	9.4	Y	+ 5	+ 5	6897	74	29.82	121	3	94.0	K	M	4	1800	1.2	94.0	4	2000	1.4	1	N	93.0	82.8	B	K	4	1500	1.0
													2	93.0	K	M	4	1600	1.0													
													4	94.0	K	M	4	1500	1.0													
216	6	E 216M5	F	N	9.4	Y	+ 5	+ 5	6971	69	29.89	58	3	93.0	K	M	3	3600	1.8	92.0	4	1500	2.0	1	N	93.0	82.8	A	K	3	3300	1.8
													2	95.0	K	M	3	3700	1.8													
													4	92.0	K	M	4	1600	1.8													

		VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
														MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																									
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	TYPE	GEAR	RPM	MV
217	6	E 216M5	F	N	9.4	N	+ 5	+ 5	10072	81	29.90	104	3	92.5	K	M	4	2400	1.2	92.0	4	1300	1.5	1	N	92.4	83.4	N				
													2	93.0	K	M	4	2400	1.2													
													4	92.0	K	M	4	1700	1.2													
218	6	E 216M5	F	N	9.4	N	+ 5	+ 5	8852	88	30.13	98	3	91.0	K	M	4	1600	1.8	91.0	4	1500	2.0	1	N	93.0	82.1	N				
													2	90.0	K	M	4	1600	1.8													
													4	90.0	K	M	4	1600	1.8													
20	29	E 220M5	F	N	8.5	Y	0	0	11579	70	29.97	60	3	98.0	K	M	4	800	0.4	98.0	4	800	3.0	1	N	92.5	83.8	A	K	4	700	3.0
													2	98.5	K	P	4	800	3.0													
													4	98.0	K	M	4	700	0.4													
219	6	E 220M5	F	N	8.5	Y	0	0	10019	63	30.26	40	3	86.0	K	M	4	2000	1.4	86.0	4	2050	1.6	1	N	93.7	84.1	N				
													2	87.0	K	M	4	2100	1.4													
													4	87.0	K	M	4	1600	1.4													
66	41	E F22A3	C	N	8.5	Y	+ 8	+ 8	6985	76	29.98	80	3	87.0	K	M	3	2900	0.7	F				1				N				
													2	88.0	K	M	3	2900	0.7													
													4	87.0	K	M	3	2900	0.7													
220	6	E F22M5	C	N	8.5	Y	+ 8	+ 8	12537	68	29.91	78	3	96.0	K	M	4	1900	2.0	96.0	4	1700	2.5	1	Y	92.8	83.3	A	K	4	2000	2.0
													2	97.0	K	M	4	2000	2.0													
													4	96.0	K	M	4	2000	2.0													
221	6	E F24A4	F	N	8.9	Y	+ 8	+ 8	10886	75	29.90	97	3	90.0	K	M	4	1800	2.0	90.0	4	1800	2.4	1				N				
													2	91.0	K	M	2	2400	2.2													
													4	89.5	K	M	4	1800	2.0													
67	41	E F24M5	C	N	8.9	Y	+ 8	+ 8	8505	74	30.02	73	3	90.0	K	M	4	2500	0.5	F				1	N	93.4	83.4	N				
													2	92.0	K	M	4	2500	0.5													
													4	89.0	K	M	4	2500	0.5													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THR	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
21	29	E F28M5	F	N	8.3	Y	+ 8	+ 8	6264	70	30.07	59	3	96.0	K	M	4	800	0.1	95.0	4	750	1.5	1	N	95.2	86.0	A	K	4	600	1.5
													2	96.5	K	M	4	900	0.1													
													4	96.0	K	M	4	850	0.1													
250	46	J 313M5	F	N	9.3	Y	0	0	7466	78	29.20	72	3	91.0	K	M	4	1300	0.5					1				N				
													2	90.0	K	M	4	1350	0.5													
													4	89.0	K	M	4	1500	0.5													
344	7	J 313M5	F	N	9.3	Y	+15	+20	16151	71	30.70	56	3	H	K	M	3	2200	1.6	100.0	4	2450	2.0	1								
													2	H	K	M	3	2100	1.6													
													4	H	K	M	3	2300	1.6													
222	6	J 315A3	F	N	9.3	Y	+21	+18	8300	82	30.00	75	3	88.0	K	M	3	2600	1.4	88.0	3	2600	1.8	1	N	92.0	82.0	N				
													2	89.0	K	M	3	2500	1.4													
													4	88.0	K	M	3	2500	1.4													
22	29	J 315M5	F	N	9.3	N	+18	+18	13066	74	29.88	68	3	95.0	K	M	3	900	0.2	F				1	O	92.1	84.1	A	K	4	750	0.4
													2	98.0	K	M	3	800	0.2													
													4	94.0	K	M	3	800	0.2													
94	5	J 315M5	F	N	9.3	Y	+18	+18	7714	70	30.10	51	3	94.0	K	M	3	1500	0.8	F				1								
													2	95.0	K	M	3	1500	0.8													
													4	94.0	K	M	3	1600	0.8													
223	6	J 315M5	F	N	9.3	N	+18	+18	10595	57	29.97	28	3	97.0	K	M	4	1300	0.4	97.0	4	1300	1.0	1	N	93.0	82.5	A	K	4	2200	0.4
													2	97.0	K	M	4	1400	0.4													
													4	97.0	K	M	4	1300	0.4													
95	5	J 318A4	F	N	8.8	Y	+16	+16	5118	70	30.04	55	3	94.0	K	M	2	3300	1.4	F				1	N	96.6	86.8	B	K	2	3000	1.4
													2	95.0	K	M	2	3000	1.8													
													4	93.0	K	M	2	3300	1.4													

AD-A145 816 1983 CRC (COORDINATING RESEARCH COUNCIL INC) OCTANE NUMBER REQUIREMENT SURVEY(U) COORDINATING RESEARCH COUNCIL INC ATLANTA GA AUG 83 CRC-539 DAAK70-81-C-0128 3/3

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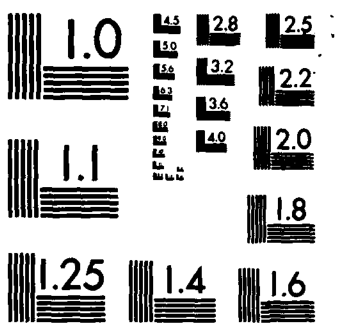


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

			VEHICLE DESCRIPTION							WEATHER				OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE						OCT NO		RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THER	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL LK	OWNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
323	26	J 318A4	F	N	8.8	Y	+16	+16	10282	80	29.86	136	3	87.0	K	M	4	2975	2.5	85.0	4	2500	4.0	1		91.2	82.6	N				
													2	88.0	K	M	4	2900	2.5													
													4	87.0	K	M	3	3400	1.5													
23	29	J 318M5	F	N	8.8	N	+ 2	+ 2	13203	70	29.97	60	3	97.0	K	M	4	800	0.2	95.0	4	800	2.5	1	N	93.0	83.7	A	K	4	700	2.5
													2	98.0	K	M	3	1300	0.2													
													4	96.0	K	M	4	750	0.2													
68	41	J 318M5	C	N	8.8	N	+10	+12	6874	79	30.10	75	3	89.0	K	M	4	1700	1.0	F				1				N				
													2	90.0	K	M	4	1700	1.0													
													4	88.0	K	M	4	1700	1.0													
224	6	J 318M5	F	N	8.8	Y	+16	+16	9207	87	29.73	100	3	91.0	K	M	4	1500	0.4	90.0	4	1500	1.0	1	N	93.0	82.4	N				
													2	91.0	K	M	4	1500	0.4													
													4	90.0	K	M	4	1400	0.4													
225	6	J 318M5	F	N	8.8	Y	+18	+16	10047	75	30.04	108	3	92.0	K	M	4	2500	1.0	91.0	4	2100	1.4	1	N			N				
													2	92.0	K	M	4	2500	1.0													
													4	92.0	K	M	4	1700	0.8													
226	6	J 318M5	F	N	8.8	Y	+16	+16	11560	82	30.00	75	3	91.0	K	M	4	1900	1.6	91.0	4	1900	1.8	1	N	93.4	83.0	N				
													2	92.0	K	M	4	1900	1.6													
													4	92.0	K	M	4	1900	1.6													
296	28	J 318M5	F	N	8.8	Y	+16	+16	10601	70	29.33	50	3	93.0	K	M	4	1700	1.0	89.0	4	1550	2.0	1				B	K	4	1800	1.0
													2	93.0	K	M	4	1650	1.0													
													4	92.0	K	M	4	1700	1.0													
69	41	Q 216M5	C	N	9.0	Y	+ 8	+ 8	10775	77	30.01	78	3	92.0	K	M	4	1500	1.0	F				1				B	K	4	1500	1.0
													2	92.0	K	M	4	1500	1.0													
													4	90.0	K	M	4	1500	1.0													

														OCTANE NUMBER REQUIREMENT DATA										TANK FUEL INFORMATION								
VEHICLE DESCRIPTION										WEATHER				MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
345	7	Q 218M4	F	N	8.7	Y	+ 9	+ 9	11096	72	29.96	64	3	91.0	K	M	4	1950	1.0	89.0	4	1600	2.0	1	N	91.2	81.3	A	K	3	3400	1.2
													2	93.0	K	M	3	3550	1.2													
													4	88.0	K	M	4	1850	1.0													
227	6	T 215A3	F	N	9.0	N	+ 5	+ 5	17688	81	29.86	72	3	88.0	K	M	3	2600	0.8	88.0	3	2600	1.5	1								
													2	88.0	K	M	3	2700	0.8													
													4	87.0	K	M	3	2600	0.8													
278	8	T 215A3	F	N	9.0	Y	+ 5	+ 5	8238	75	29.20	49	3	87.0	K	M	3	2250	1.1	F				1				N				
													2	88.0	K	M	3	2250	1.1													
													4	85.0	K	M	2	2800	0.5													
348	60	T 215A3	F	N	9.0	Y	+ 5	+ 5	28629	65	29.19	59	3	88.0	K	M	3	2500	2.0	87.0	3	2300	3.0	1				N				
													2	89.0	K	M	3	2300	2.0													
													4	88.0	K	M	3	2600	2.0													
24	29	T 215M5	F	N	9.0	Y	+ 5	+ 5	15035	70	30.32	58	3	98.0	K	M	2	1500	0.2	97.0	4	1200	2.0	1	O	92.3	84.1	A	K	4	1000	2.0
													2	98.0	K	M	3	1500	0.2													
													4	97.0	K	M	3	1300	0.2													
70	41	T 215M5	C	N	9.0	Y	+12	+ 5	10389	71	30.12	68	3	91.0	K	M	4	1750	0.8	90.0	4	1750	1.5	1	N	93.6	83.0	A	K	4	1750	0.8
													2	91.0	K	M	4	1750	0.8													
													4	91.0	K	M	4	1750	0.8													
96	5	T 215M5	F	N	9.0	N	+ 6	+ 6	7710	75	30.19	66	3	91.0	K	M	4	1600	1.0	90.0	4	1600	3.0	1	N	93.0	82.9	B	K	4	1600	1.0
													2	92.0	K	M	4	1650	1.0													
													4	91.0	K	M	4	1600	1.0													
346	7	T 215M5	F	N	9.0	Y	+ 8	+ 5	8101	70	30.30	61	3	91.0	K	M	4	1850	0.6	F				1	N			A	K	3	2250	0.7
													2	93.0	K	M	3	1850	0.7													
													4	91.0	K	M	4	1950	0.6													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THR	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	RATER NTINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
352	60	T 215M5	F	N	9.0	Y	+ 5	+ 5	12932	73	29.56	58	3	96.0	K	M	4	2100	0.6	94.0	4	2000	2.0	1	Y	92.7	82.2	A	K	4	2800	0.6
													2	97.0	K	M	4	2050	0.6													
													4	95.0	K	M	4	2200	0.6													
97	5	T 216A3	F	N	9.0	Y	+ 5	+ 5	14511	70	29.92	54	3	91.0	K	M	2	2700	1.2	F				1								
													2	92.0	K	M	2	2700	1.2													
													4	90.0	K	M	2	2750	1.2													
228	6	T 216A3	F	N	9.0	Y	+ 6	+ 5	13820	80	29.87	112	3	90.0	K	M	2	2700	2.0	89.0	3	2200	2.5	1								
													2	90.0	K	M	2	2600	2.0													
													4	90.0	K	M	2	2400	2.0													
279	8	T 216A3	F	N	9.0	Y	+ 5	+ 5	9470	81	29.67	87	3	91.0	K	M	2	3000	1.2	88.0	3	1950	4.0	1				B	K	2	3000	1.2
													2	92.0	K	M	2	2900	1.2													
													4	88.0	K	M	2	2950	1.2													
280	8	T 216A3	F	N	9.0	Y	+ 5	+ 5	13957	74	29.98	69	3	90.0	K	M	3	2400	1.3	88.0	3	2250	3.0	1				B	K	3	2300	1.3
													2	92.0	K	M	3	2400	1.3													
													4	89.0	K	M	3	2350	1.3													
324	26	T 216A3	F	N	9.0	Y	+ 5	+ 5	7583	77	30.00	100	3	92.0	K	M	2	3600	1.4	91.0	3	2200	1.2	1		91.2	82.6	B	K	3	2100	0.8
													2	93.0	K	M	3	3450	0.8													
													4	90.0	K	M	3	3000	0.8													
349	60	T 216A3	F	N	9.0	Y	+ 5	+ 5	9625	65	29.37	75	3	88.0	K	M	3	1500	2.5	87.0	3	2500	3.5	1				B	K	3	2800	2.5
													2	88.0	K	M	3	2600	2.5													
													4	87.0	K	M	3	2200	2.5													
353	60	T 216A3	F	N	9.0	Y	+ 8	+ 5	22817	71	30.08	56	3	92.0	K	M	3	2800	0.9	92.0	3	2650	2.0	1	O	93.3	82.2	A	K	3	3300	0.9
													2	95.0	K	M	2	3050	0.8													
													4	90.0	K	M	3	3000	0.9													

			VEHICLE DESCRIPTION								WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
								SPARK ADVANCE							MAXIMUM						PART THROTTLE								RATER				
OBS NO	LAB NO		MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
43	4	T	216M4	F	N	9.0	Y	+ 5	+ 5	6062	86	28.93	95	3	91.0	K	M	3	1550	0.3	90.0	4	1600	1.0	1	N	98.4	86.0	N				
														2	92.0	K	M	4	1550	0.4													
														4	91.0	K	M	3	1550	0.3													
71	41	T	216M5	C	N	9.0	N	+ 5	+ 5	12422	70	30.00	66	3	92.0	K	M	4	1750	0.6	F				1	Y	92.8	82.9	A	K	4	1750	0.6
														2	93.0	K	M	4	1750	0.6													
														4	92.0	K	M	4	1750	0.6													
354	60	T	216M5	F	N	9.0	N	+ 7	+ 5	9813	72	30.40	66	3	88.0	K	M	4	2800	0.6	85.0	4	1750	2.0	1	O	93.3	83.1	B	K	3	·2300	0.7
														2	91.0	K	M	4	2350	0.6													
														4	90.0	K	M	4	2100	0.6													
229	6	T	F20A4	F	N	8.7	Y	+ 5	+ 5	7039	58	30.16	60	3	89.0	K	M	4	2000	0.5	87.0	4	1900	0.7	1	N	93.1	83.7	N				
														2	89.0	K	M	4	1900	0.5													
														4	90.0	K	M	3	2300	0.4													
230	6	T	F24A4	F	N	9.0	Y	+ 5	+ 5	8574	72	29.83	81	3	88.0	K	M	4	2300	1.0	88.0	4	2250	1.2	1								
														2	88.5	K	M	3	2200	1.0													
														4	88.0	K	M	4	2300	1.0													
25	29	T	224M5	F	N	9.0	Y	+ 5	+ 5	9130	70	30.06	62	3	95.5	K	P	4	1000	3.0	95.5	4	1000	3.0	1	O	92.8	84.0	A	K	4	850	3.0
														2	96.5	K	P	4	1100	3.0													
														4	96.0	K	P	4	1050	3.0													
72	41	T	224M5	C	N	9.0	Y	+ 5	+ 5	11719	74	30.16	73	3	92.0	K	M	4	1800	0.6	F				1				B	K	4	1800	0.6
														2	92.0	K	M	4	1800	0.6													
														4	90.0	K	M	4	1800	0.6													
231	8	T	224M5	F	N	9.0	Y	+ 3	+ 5	21660	79	30.27	75	3	94.0	K	M	4	1250	0.4	94.0	4	1600	0.6	1	N	93.5	84.0	A	K	3	1300	0.4
														2	95.5	K	M	3	1200	0.4													
														4	95.0	K	M	3	1300	0.4													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	NTYPE	THR	GEAR	RPM	MV	PART THROTTLE OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	RATER NTYPE	GEAR	RPM	MV
347	7	T 224M5	F	N	9.0	N	+ 5	+ 5	13842	69	30.02	58	3	93.0	K	M	4	1950	0.3	91.0	4	1950	2.0	1	N	92.9	82.4	A	K	3	2000	0.2
													2	93.0	K	M	4	2200	0.3													
													4	90.0	K	M	4	2150	0.3													
355	60	T 224M5	F	N	9.0	Y	+ 3	+ 5	6768	68	30.10	60	3	92.0	K	M	3	1800	0.5	92.0	4	1550	2.0	1	N	91.7	82.2	A	K	3	1800	0.5
													2	95.0	K	M	3	1850	0.5													
													4	92.0	K	M	4	2000	0.6													
26	29	T F28A4	F	N	8.8	Y	+ 8	+ 8	11621	70	29.86	62	3	93.0	K	M	3	1900	2.0	90.0	3	1900	4.0	1	Y	92.8	83.7	A	K	3	1800	2.0
													2	94.0	K	M	3	1900	2.0													
													4	90.0	K	M	3	1900	2.0													
27	29	T F28A4	F	N	8.8	Y	+ 8	+ 8	11422	70	30.08	62	3	92.5	K	M	3	2000	1.2	90.0	3	1900	4.0	1	Y	92.7	84.0	B	K	3	2100	1.2
													2	94.0	K	M	3	2000	1.2													
													4	90.0	K	M	3	2000	1.2													
232	6	T F28A4	F	N	8.8	Y	+10	+10	7779	62	30.48	62	3	83.0	K	M	3	2800	1.8	F				1	N	96.2	86.7	N				
													2	85.0	K	M	2	3000	1.8													
													4	83.0	K	M	3	2600	1.8													
297	28	T F28A4	F	N	8.8	Y	+10	+10	10469	70	29.56	50	3	84.0	K	M	4	2200	2.0	80.0	4	1700	4.0	1				N				
													2	87.0	K	M	4	1900	2.0													
													4	81.0	K	M	4	2000	2.0													
298	28	T F28A4	F	N	8.8	Y	+10	+10	14846	70	29.46	50	3	83.0	K	M	4	2400	2.0	80.0	4	2300	5.0	1				N				
													2	85.0	K	M	4	2400	2.0													
													4	79.0	K	M	4	2600	2.0													
299	28	T F28A4	F	N	8.8	Y	+10	+10	10801	70	29.34	50	3	78.0	K	M	4	2600	1.5	L				1				N				
													2	82.0	K	M	4	2700	1.5													
													4	77.0	K	M	4	2600	1.5													

VEHICLE DESCRIPTION										WEATHER			OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
														MAXIMUM						PART THROTTLE								RATER				
							SPARK ADVANCE																			OCT NO						
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	RES	MOT	NINT	NTYPE	GEAR	RPM	MV
350	60	T F28A4	F	N	8.8	Y	+10	+10	12269	75	29.36	62	3	84.0	K	M	3	2000	1.5	84.0	3	2000	2.0	1				N				
													2	84.0	K	M	2	1300	2.0													
													4	84.0	K	M	3	1800	2.0													
365	40	T F28A4	F	N	8.8	Y	+10	+10	5590	35	29.92	14	3	83.0	K	M	3	3100	1.0					1				N				
													2	84.0	K	M	3	3000	1.0													
													4	83.0	K	M	3	3100	1.0													
233	6	T F28M5	F	N	8.8	Y	+12	+10	7443	52	30.42	33	3	86.0	K	M	4	2800	0.4	85.0	4	2700	0.8	1	N	98.5	86.2	N				
													2	87.0	K	M	4	2900	0.4													
													4	86.0	K	M	4	2500	0.4													
325	26	X F18A3	F	N	9.3	Y	+15	+15	8790	66	30.23	60	3	94.0	K	M	3	2650	0.5	91.0	3	2650	1.2	1		93.6	83.0	B	K	3	2700	0.5
													2	95.0	K	M	3	2600	0.5													
													4	91.0	K	M	3	2750	0.5													
366	40	X F18M5	F	N	9.3	Y	+15	+15	10850	62	29.97	44	3	88.0	K	M	4	2800	0.5	85.5	4	2800	7.5	1				N				
													2	90.0	K	M	4	2800	0.5													
													4	87.5	K	M	4	2900	0.5													
28	29	Z 215M4	F	N	9.0	N	+ 8	+ 8	8943	75	29.88	68	3	87.0	K	M	4	1000	0.5	F				1	N			N				
													2	90.0	K	M	4	1000	0.5													
													4	84.0	K	M	4	900	0.5													
98	5	ZR 411M5	F	N	9.4	Y	+20	+20	11428	72	30.09	66	3	83.0	K	P	4	3300	2.0	83.0	4	3300	2.0	1								
													2	84.5	K	P	4	3050	2.0													
													4	81.0	K	P	4	3300	2.0													
367	40	ZR 411M5	F	N	9.4	Y	+20	+20	9800	38	29.49	20	3	83.0	K	P	4	3250	2.0	83.0	4	3250	2.0	1				N				
													2	83.0	K	P	4	3400	2.0													
													4	81.5	K	P	4	3400	2.0													

VEHICLE DESCRIPTION							SPARK ADVANCE			WEATHER			OCTANE NUMBER REQUIREMENT DATA	MAXIMUM						PART THROTTLE				TANK FUEL INFORMATION				RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
99	5	ET 222M4	F	N	8.5	N	+ 4	+ 4	7670	70	30.23	52	3	94.5	K	M	4	1400	1.1	90.0	4	1450	2.5	1	N	96.7	87.1	N				
													2	94.5	K	M	4	1400	1.1													
													4	93.0	K	M	3	1400	1.0													
29	29	KT 226A3	F	N	8.2	Y	+12	+12	6813	70	30.12	72	3	92.0	K	M	3	1800	0.8	88.0	3	1800	4.0	1	N	91.9	84.0	B	K	3	1800	0.8
													2	94.0	K	M	3	2000	0.8													
													4	88.0	K	M	3	1800	0.8													
73	41	TT 224M4	C	N	9.0	N	+ 5	+ 5	6609	81	29.88	76	3	92.0	K	M	4	1600	0.6	F				1	N	92.9	83.0	B	K	4	1600	0.6
													2	92.0	K	M	4	1600	0.6													
													4	91.5	K	M	4	1600	0.6													
44	4	TT 224M5	F	N	9.0	Y	+ 5	+ 5	5915	83	29.09	63	3	89.0	K	M	3	1550	0.2	89.0	4	1500	2.0	1	N	91.9	82.6	B	K	3	1600	0.2
													2	90.0	K	M	3	1700	0.2													
													4	89.0	K	M	3	1500	0.2													
326	26	TT 224M5	F	N	9.0	Y	+5	+5	11236	72	30.25	63	3	91.0	K	M	4	1450	0.5	89.0	4	1425	1.5	1	N	92.2	82.7	B	K	4	1500	0.5
													2	91.0	K	M	4	1450	0.5													
													4	90.0	K	M	3	1600	0.5													
351	60	TT 224M5	F	N	9.0	Y	+ 8	+ 8	7528	75	29.04	112	3	90.0	K	M	4	1600	1.0	87.5	4	1400	3.0	1				B	K	4	1400	1.0
													2	90.0	K	M	4	1400	1.0													
													4	89.5	K	M	4	1600	1.0													
356	60	TT 224M5	F	N	9.0	N	+ 5	+ 5	15300	70	29.81	58	3	96.0	K	M	4	2150	0.4	94.0	4	2300	2.0	1	Y	92.3	82.1	A	K	3	3200	0.2
													2	96.0	K	M	3	2400	0.2													
													4	91.0	K	M	4	2150	0.4													
509	5	HGA 238A3	F	Y H	8.0	Y	+13	+13	13722	70	30.13	50	3	92.0	K	M	2	1800	1.0	F				1								
													2	94.0	K	M	2	1800	1.0													
													4	90.0	K	M	2	1800	1.0													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THER	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
510	5	HGA 238A3	F	Y	L	8.0	Y	+13	+13	13722	70	30.13	50	3	82.0	K	M	2	1800	1.0	F				1							
														2	84.0	K	M	2	1800	1.0												
														4	82.0	K	M	2	1800	1.0												
501	41	IGA 238A3	C	Y	H	8.0	Y	+15	+15	6042	70	30.26	67	3	89.0	K	M	3	1700	1.2	F				1				N			
														2	90.0	K	M	3	1700	1.2												
														4	87.0	K	M	3	1700	1.2												
502	41	IGA 238A3	C	Y	L	8.0	Y	+15	+15	6042	70	30.26	67	3	85.0	K	M	3	1700	1.2	F				1				N			
														2	87.0	K	M	3	1700	1.2												
														4	85.0	K	M	3	1700	1.2												
527	31	KL8 222M5	F	Y	H	9.5	N	+15	+15	4660	84	28.80	109	3	94.0	K	P	4	2000	4.0	94.0	4	2000	4.0	1							
														2																		
														4																		
519	28	LAE 230A3	F	Y	H	8.5	Y	+15	+15	15245	70	29.48	50	3	90.0	K	M	3	1900	1.5	87.0	3	1700	3.0	1							
														2	92.0	K	M	3	1900	1.5												
														4	88.0	K	M	3	1500	1.5												
520	28	LAE 230A3	F	Y	L	8.5	Y	+15	+15	15245	70	29.48	50	3	L						L				1							
														2	80.0	K	M	3	1500	1.5												
														4	77.0	K	M	3	1200	1.5												
513	23	LB4 441A4	F	Y	H	8.0	Y	+15	+15	11248	58	28.45	44	3	98.0	K	M	3	2300	0.8	F				1				B	K	3	2200	0.8
														2	98.0	K	M	3	2300	0.8												
														4	92.0	K	M	3	2300	0.8												
514	23	LB4 441A4	F	Y	L	8.0	Y	+15	+15	11248	58	28.45	44	3	87.0	K	M	3	2200	0.8	F				1				B	K	3	2200	0.8
														2	88.0	K	M	3	2300	0.8												
														4	87.0	K	M	3	2200	0.8												

		VEHICLE DESCRIPTION								WEATHER				OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION							
							SPARK ADVANCE							MAXIMUM						PART THROTTLE								RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	TPHER	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
500	29	LGA 238A3	F	Y	H	8.0 Y	+15	+15	16618	70	30.31	70	3	93.0	K	M	2	1700	1.0					1		95.1	85.6	A	K	3	1600	1.4
													2	96.0	K	M	3	1750	1.4													
													4	94.5	K	M	2	1600	1.0													
503	5	LGA 238A3	F	Y	H	8.0 Y	+12	+15	9570	73	30.10	47	3	93.0	K	M	2	2000	1.1	F				1								
													2	96.0	K	M	2	2000	1.1													
													4	90.0	K	M	2	1900	1.1													
504	5	LGA 238A3	F	Y	L	8.0 Y	+12	+15	9570	73	30.10	47	3	91.0	K	M	2	2000	1.1	F				1								
													2	96.0	K	M	2	2000	1.1													
													4	89.0	K	M	2	1900	1.1													
521	28	LGA 238A3	F	Y	H	8.0 Y	+15	+15	15580	70	29.36	50	3	87.0	K	M	3	1850	1.0	F				1				N				
													2	87.0	K	M	3	1800	1.0													
													4	86.0	K	M	3	1700	1.0													
522	28	LGA 238A3	F	Y	L	8.0 Y	+15	+15	15580	70	29.36	50	3	82.0	K	M	3	1700	1.0	F				1								
													2	82.0	K	M	3	1650	1.0													
													4	80.0	K	M	3	1550	1.0													
523	28	LGA 238A3	F	Y	H	8.0 Y	+15	+15	21328	70	29.28	50	3	92.0	K	M	3	1900	1.5	90.0	3	1700	3.0	1				B	K	3	1500	1.5
													2	94.0	K	M	3	1700	1.5													
													4	89.0	K	M	3	1750	1.5													
524	28	LGA 238A3	F	Y	L	8.0 Y	+15	+15	21328	70	29.28	50	3	88.0	K	M	3	1500	1.5	86.0	3	1300	3.0	1								
													2	88.0	K	M	3	1450	1.5													
													4	86.0	K	M	3	1550	1.5													
525	26	LGA 238A3	F	Y	H	8.0 Y	+15	+15	6939	77	30.22	30	3	101.0	K	M	3	1700	1.0	99.0	3	1700	5.0	1		91.2	82.6	B	K	3	1700	3.0
													2	101.0	K	M	3	1700	1.5													
													4	95.0	K	M	3	2000	1.0													

			VEHICLE DESCRIPTION							WEATHER				OCTANE NUMBER REQUIREMENT DATA											TANK FUEL INFORMATION								
							SPARK ADVANCE							MAXIMUM						PART THROTTLE									RATER				
OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	OCT NO	NTYPE	THR	GEAR	RPM	MV	OCT NO	GEAR	RPM	MV	FUEL	OWKNK	OCT NO RES	OCT NO MOT	NINT	NTYPE	GEAR	RPM	MV
526	26	LGA 238A3	F	Y	L	8.0	Y	+15	+15	6939	77	30.22	30	3	90.0	K	M	3	1700	1.0	87.0	3	1700	5.0	1								
														2	89.0	K	M	3	1700	1.0													
														4	89.0	K	M	3	1800	1.0													
517	28	NFS F50A4	F	Y	H	9.5	Y	+ 6	+ 6	15606	70	29.55	50	3	90.0	K	M	4	2000	1.0	86.0	4	1800	4.0	1				N				
														2	91.0	K	M	4	2150	1.0													
														4	87.0	K	M	4	2000	1.0													
518	28	NFS F50A4	F	Y	L	9.5	Y	+ 6	+ 6	15606	70	29.55	50	3	87.0	K	M	4	1700	1.0	85.0	4	1800	4.0	1								
														2	88.0	K	M	4	1600	1.0													
														4	84.0	K	M	4	1550	1.0													
511	23	NY8 F57A4	F	Y	H	9.0	Y	+ 7	+ 6	5939	66	28.50	46	3	94.0	K	M	3	900	0.6	91.0	3	1100	4.0	1								
														2	94.0	K	M	3	900	0.6													
														4	92.0	K	M	3	1100	0.6													
512	23	NY8 F57A4	F	Y	L	9.0	Y	+ 7	+ 6	5939	66	28.50	46	3	94.0	K	M	3	900	0.6	90.0	4	1000	2.0	1								
														2	94.0	K	M	3	900	0.6													
														4	91.0	K	M	3	1100	0.6													
505	5	NTLH 450A4	F	Y	H	8.6	Y	+ 6	+ 4	10563	70	30.15	56	3	81.0	K	M	4	1000	2.0	78.0	4	1150	5.0	1	N	92.0	82.4	N				
														2	82.0	K	M	3	1750	2.2													
														4	81.0	K	M	3	1900	2.2													
506	5	NTLH 450A4	F	Y	L	8.6	Y	+ 6	+ 4	10563	70	30.15	56	3	81.0	K	M	4	1000	2.0	78.0	4	1150	5.0	1	N	92.0	82.4	N				
														2	81.0	K	M	3	1800	2.2													
														4	81.0	K	M	3	1900	2.2													
507	5	NTMH 450M4	F	Y	H	8.6	N	+ 6	+ 6	7282	75	30.48	48	3	92.0	K	M	4	1400	0.2	F				1								
														2	93.0	K	M	4	1400	0.2													
														4	92.0	K	M	4	1400	0.2													

OBS NO	LAB NO	MODEL CODE	EMCT	KNK SEN	C.R.	AIR	SPARK ADVANCE AS RCD	SPARK ADVANCE AS TST	ODOM MILES	AMB TMP	BAROM	HUM	FUEL	MAXIMUM OCT NO	MAXIMUM NTYPE	MAXIMUM THER	MAXIMUM GEAR	MAXIMUM RPM	MAXIMUM MV	PART THROTTLE OCT NO	PART THROTTLE GEAR	PART THROTTLE RPM	PART THROTTLE MV	TANK FUEL	OWNK	OCT NO RES	OCT NO MOT	RATER NINT	RATER NTYPE	RATER GEAR	RATER RPM	RATER MV
508	5	NTMH 450M4	F	Y	L	8.6	N	+ 6	+ 6	7282	75	30.48	48	3	88.0	K	M	4	1400	0.2	F				1							
													2	89.0	K	M	4	1400	0.2													
													4	88.0	K	M	4	1400	0.2													
515	23	NVMH 450A4	F	Y	H	8.6	Y	+ 4	+ 4	17375	46	28.75	34	3	87.0	K	M	4	1800	1.8	85.0	4	1700	3.0	1				N			
													2	88.0	K	M	3	2000	1.4													
													4	87.0	K	M	4	1800	1.8													
516	23	NVMH 450A4	F	Y	L	8.6	Y	+ 4	+ 4	17375	46	28.75	34	3	82.0	K	M	4	1800	1.8	78.0	4	1700	3.0	1							
													2	82.0	K	M	3	2000	1.4													
													4	82.0	K	M	4	1700	1.8													
528	40	A TF20M5	F	Y	H	8.5	Y	+20	+20	8320	79	29.72	104	3	98.0	K	M	4	2800	0.0					1	N	97.0	86.0	B	K	4	2750	0.0
													2	96.0	K	M	3	4000	0.0													
													4	H	K	M	4	2800	0.0													
529	40	A TF20M5	F	Y	L	8.5	Y	+20	+20	8320	79	29.72	104	3	96.0	K	M	4	2900	0.0					1	N	97.0	86.0	B	K	4	2750	0.0
													2	96.0	K	M	3	4000	0.0													
													4	98.0	K	M	4	2800	0.0													

A P P E N D I X   F

PROCEDURES FOR PLOTTING
OCTANE NUMBER REQUIREMENT DISTRIBUTION DATA

WEIGHTED VEHICLE/CAR POPULATIONS

Weighting factors for each vehicle model were developed from information supplied by the US vehicle manufacturers and from information published (Ward's Automotive Reports) for imported vehicles. These weight factors were proportioned to the relative production and/or sales volumes of the vehicles tested.

For any vehicle having octane requirements lower (L) than the lowest octane number fuel available within a given fuel series, a number 0.5 Research/0.4 Motor lower was assigned. Similarly, for any vehicle having octane requirements higher (H) than the highest octane fuel available within a given fuel series, a number 0.5 Research/0.4 Motor higher was assigned.

The weighting factors of each vehicle model were divided by the number of vehicles tested to calculate individual vehicle weight factors. The octane requirements for each vehicle were then arranged in increasing order with the appropriate individual weighting factors. The percent of vehicles at each octane requirement level represents the summation of all vehicle weighting factors before that level, plus one-half the sum of the weighting factors at that level. The individual vehicle weighting factors are adjusted so that the summation of all weighting factors is 100.00 for any vehicle population of interest. The midpoint percentiles are plotted versus octane number requirement on arithmetic probability paper and a distribution curve is drawn through the points. These distributions are then plotted point to point on Cartesian coordinates for figures shown in the survey report.

SELECT CAR MODELS

For individual car models, the octane number requirement distribution curves were plotted by the "Z" method as described in "Statistical Estimation of the Gasoline Octane Number Requirement of New Model Automobiles," C. S. Brinegar and R. R. Miller, Technometrics, Vol. 2, No. 1, February 1960.

The procedure is as follows:

For any cars having octane requirements lower (L) than the lowest octane number fuel available within a given fuel level, a number 1.0 Research/0.7 Motor lower was assigned. Similarly, for individual cars having octane requirements higher (H) than the highest octane fuel available within a given fuel series, a number 1.5 Research/1.1 Motor higher was assigned.

Using all observed and estimated octane number values, calculate the mean $(\bar{X})$ and the standard deviation (s) from the data for each car model.

1. $$\overline{X} = \frac{\Sigma X_i}{n}$$

$$s = \sqrt{\frac{1}{n-1}\left[\Sigma \wedge_i^{2} - \left(\frac{\Sigma X_i}{n}\right)^{2}\right]}$$

Where X_i = Octane number requirement of i^{th} car of a given model

n = Number of cars of that model.

2. Estimate octane number requirements at the percentiles of interest from octane number requirement distribution data by

$$\text{O.N.} = \overline{X} + ks$$

Where k is selected from normal distribution tables.

Values of k used to calculate percentiles in this report are:

Percentile	k
5	-1.645
10	-1.282
20	-0.842
30	-0.524
40	-0.253
50	0
60	+0.253
70	+0.524
80	+0.842
90	+1.282
95	+1.645

The requirements were arranged in increasing order and plotted on arithmetic probability paper; the percent satisfaction for any car is calculated by the following relationship:

$$\text{Percent satisfied: } i^{th} \text{ car} = \frac{(i-0.5)}{N}\ 100$$

Where N is the total number of cars tested for a given fuel and i is an integer having increasing values from 1 to N.

3. For this report, straight-line octane number requirement versus percent car satisfaction curves for the select models were drawn via a two-point plot of the mean and standard deviation. From inspection of the curves, revised L and H values may be indicated. An alternate method to obtain the octane number requirement/percent satisfied curves is to fair a curve through plotted points.

APPENDIX G

CONFIDENCE LIMITS OF
OCTANE NUMBER REQUIREMENT DISTRIBUTIONS

CONFIDENCE LIMITS OF OCTANE NUMBER REQUIREMENT DISTRIBUTIONS

Octane number requirements of vehicles presented in this survey are determined at the levels that satisfy certain percentages of specific vehicle populations. In many cases, the recorded octane number requirement is followed by a plus and minus limit, referred to as the confidence interval. These limits give the interval within which the requirement for that satisfaction level would be expected 95 percent of the time in replicate testing.

At the 50 percent satisfaction level, the 95 percent confidence interval is calculated as follows:

$$CI = \pm ts/\sqrt{n}$$

where t = Students t at the proper number of degrees of freedom*

s = Standard deviation, calculated directly from the data or estimated as the difference between the 84.16th and 50th percentiles (assuming normal distribution)

n = Number of vehicles in population.

At other satisfaction levels:

$$CI = \pm ts\sqrt{1/n + k^2/[2(n-1)]}$$

At the 90 percent satisfaction level, k = 1.2817. For other satisfaction levels, appropriate values for k may be found in the standard statistical tables.

Degrees of Freedom	t	Degrees of Freedom	t
1	12.706	18	2.101
2	4.393	19	2.093
3	3.182	20	2.086
4	2.776	21	2.080
5	2.571	22	2.074
6	2.447	23	2.069
7	2.365	24	2.064
8	2.306	25	2.060
9	2.262	26	2.056
10	2.228	27	2.052
11	2.201	28	2.048
12	2.179	29	2.045
13	2.160	30	2.042
14	2.145	40	2.021
15	2.131	60	2.000
16	2.120	120	1.980
17	2.110	∞	1.960

* Distribution of t for probability = 0.05.
** Degrees of Freedom = (n-1).

TABLE G-I

95% CONFIDENCE LIMITS FOR MAXIMUM OCTANE NUMBER REQUIREMENTS

1983 Weighted Population Groups

Population	Fuel	n	t	Std. Dev. (s) RON	Std. Dev. (s) MON	95% Confidence Limits RON 50%	RON 90%	MON 50%	MON 90%
US and Imported Vehicles									
Including Knock Sensors Maximum (high borderline) Requirement	PR	376	1.966	3.07	3.07	0.31	0.42	0.31	0.42
	FBRU	383	1.966	3.86	2.43	0.39	0.52	0.24	0.33
	FBRSU	376	1.966	4.58	2.96	0.46	0.63	0.30	0.41
Including Knock Sensors Minimum (low-borderline) Requirement	PR	375	1.966	3.11	3.11	0.32	0.43	0.32	0.43
	FBRU	381	1.966	3.79	2.40	0.38	0.52	0.24	0.33
	FBRSU	375	1.966	4.53	2.90	0.46	0.62	0.29	0.40
Excluding Knock Sensors	PR	361	1.967	2.99	2.99	0.31	0.42	0.31	0.42
	FBRU	367	1.967	3.73	2.35	0.38	0.52	0.24	0.33
	FBRSU	361	1.967	4.46	2.88	0.46	0.62	0.30	0.40
US and Imported Cars									
Including Knock Sensors Maximum (high borderline) Requirement	PR	352	1.967	3.26	3.26	0.34	0.46	0.34	0.46
	FBRU	359	1.967	4.11	2.60	0.43	0.58	0.27	0.36
	FBRSU	352	1.967	4.89	3.17	0.51	0.69	0.33	0.45
Including Knock Sensors Minimum (low borderline) Requirement	PR	351	1.967	3.29	3.29	0.35	0.47	0.35	0.47
	FBRU	357	1.967	4.01	2.56	0.42	0.56	0.27	0.36
	FBRSU	351	1.967	4.85	3.13	0.51	0.69	0.33	0.44
Excluding Knock Sensors	PR	340	1.967	3.17	3.17	0.34	0.46	0.34	0.46
	FBRU	346	1.967	3.96	2.51	0.42	0.56	0.27	0.36
	FBRSU	340	1.967	4.79	3.09	0.51	0.69	0.33	0.44

TABLE G-I - (Continued)

Population	Fuel	n	t	Std. Dev. (s)		95% Confidence Limits			
						RON		MON	
				RON	MON	50%	90%	50%	90%
US Vehicles									
Including Knock Sensors Maximum (high borderline) Requirement	PR	293	1.968	2.92	2.92	0.34	0.45	0.34	0.45
	FBRU	300	1.968	3.70	2.34	0.42	0.57	0.27	0.36
	FBRSU	293	1.968	4.76	3.07	0.55	0.74	0.35	0.48
Including Knock Sensors Minimum (low borderline) Requirement	PR	292	1.968	2.97	2.97	0.34	0.46	0.34	0.46
	FBRU	298	1.968	3.58	2.30	0.41	0.55	0.26	0.35
	FBRSU	292	1.968	4.52	2.88	0.52	0.70	0.33	0.45
Excluding Knock Sensors	PR	279	1.969	2.83	2.83	0.33	0.45	0.33	0.45
	FBRU	285	1.968	3.57	2.27	0.42	0.56	0.26	0.36
	FBRSU	279	1.969	4.56	2.93	0.54	0.73	0.35	0.47
US Cars									
Including Knock Sensors Maximum (high borderline) Requirement	PR	276	1.969	3.12	3.12	0.37	0.50	0.37	0.50
	FBRU	283	1.968	3.97	2.52	0.46	0.63	0.29	0.40
	FBRSU	276	1.969	5.19	3.36	0.62	0.83	0.40	0.54
Including Knock Sensors Minimum (low borderline) Requirement	PR	275	1.969	3.15	3.15	0.37	0.50	0.37	0.50
	FBRU	281	1.969	3.86	2.48	0.45	0.61	0.29	0.39
	FBRSU	275	1.969	5.03	3.22	0.60	0.81	0.38	0.52
Excluding Knock Sensors	PR	265	1.969	3.00	3.00	0.36	0.49	0.36	0.49
	FBRU	271	1.969	3.85	2.45	0.46	0.62	0.29	0.40
	FBRSU	265	1.969	5.01	3.22	0.61	0.82	0.39	0.53
Imported Vehicles									
Including Knock Sensors Maximum (high borderline) Requirement	PR	83	1.988	4.62	4.62	1.01	1.36	1.01	1.36
	FBRU	83	1.988	4.10	2.61	0.89	1.21	0.57	0.77
	FBRSU	83	1.988	3.94	2.58	0.86	1.16	0.56	0.76
Excluding Knock Sensors	PR	82	1.989	4.48	4.48	0.98	1.33	0.98	1.33
	FBRU	82	1.989	3.96	2.51	0.87	1.18	0.55	0.75
	FBRSU	82	1.989	3.96	2.59	0.87	1.18	0.57	0.77

TABLE G-II

95% CONFIDENCE LIMITS FOR MAXIMUM OCTANE NUMBER REQUIREMENTS

1983 Select Models

Model	Fuel	n	t	Std. Dev. (s) RON	Std. Dev. (s) MON	95% Confidence Limits RON 50%	RON 90%	MON 50%	MON 90%
NGA 238A3/HGA 238A3/ IGA 238A3/LGA 238A3	PR	14	2.160	4.421	4.421	2.55	3.50	2.55	3.50
	FBRU	14	2.160	6.011	4.123	3.47	4.76	2.38	3.27
	FBRSU	14	2.160	6.593	4.601	3.81	5.22	2.66	3.65
NJP F20A3/LJP F20A3/ GJP F20A3	PR	22	2.080	2.481	2.481	1.10	1.50	1.10	1.50
	FBRU	22	2.080	2.309	1.537	1.02	1.40	0.68	0.93
	FBRSU	22	2.080	2.922	2.014	1.30	1.77	0.89	1.22
OA4 216A3/MA4 216A3	PR	16	2.131	2.173	2.173	1.16	1.59	1.16	1.59
	FBRU	16	2.131	2.516	1.603	1.34	1.84	0.85	1.17
	FBRSU	16	2.131	2.763	1.763	1.47	2.02	0.94	1.29
OD3 238A3/OD3 238A4/ MD3 238A3/OE3 238A3/ OE3 238A4/ME3 238A4	PR	21	2.086	3.568	3.568	1.62	2.22	1.62	2.22
	FBRU	21	2.086	3.476	2.339	1.58	2.16	1.06	1.45
	FBRSU	21	2.086	3.575	2.479	1.63	2.22	1.13	1.54
PK3 222A3/KKC 222A3/ DKC 222A3/KEC 222A3/ DEC 222A3	PR	20	2.093	3.927	3.927	1.84	2.51	1.84	2.51
	FBRU	21	2.086	4.610	3.120	2.10	2.86	1.42	1.94
	FBRSU	20	2.093	5.173	3.548	2.42	3.31	1.66	2.27

A P P E N D I X   H

OCTANE NUMBER REQUIREMENTS
OF KNOCK SENSOR-EQUIPPED VEHICLES

TABLE H-I

OCTANE NUMBER REQUIREMENTS OF KNOCK SENSOR-EQUIPPED VEHICLES*

	Reference Fuels					
	FBRSU		FBRU		PRF	
Model Code	High**	Low **	High**	Low **	High**	Low **
NTLH 450A4	82.0	81.0	81.0	81.0	81.0	81.0
LGA 238A3	87.0	82.0	87.0	82.0	86.0	80.0
NVMH 450A4	88.0	82.0	87.0	82.0	87.0	82.0
IGA 238A3	90.0	87.0	89.0	85.0	87.0	85.0
NFS F50A4	91.0	88.0	90.0	87.0	87.0	84.0
LAE 230A3	92.0	80.0	90.0	L	86.0	77.0
NTMH 450M4	93.0	89.0	92.0	88.0	92.0	88.0
LGA 238A3	94.0	88.0	92.0	88.0	89.0	86.0
HGA 238A3	94.0	84.0	92.0	82.0	90.0	82.0
LGA 238A3	96.0	96.0	93.0	91.0	90.0	89.0
LGA 238A3	96.0	--	93.0	--	94.5	--
KL8 222M5	--	--	94.0	--	--	--
NY8 F57A4	94.0	94.0	94.0	94.0	92.0	91.0
LB4 441A4	98.0	88.0	96.0	87.0	92.0	87.0
A TF20M5	96.0	96.0	98.0	96.0	H	98.0
LGA 238A3	101.0	89.0	101.0	90.0	95.0	89.0

* Listed in order of increasing octane number requirement.

** High = Maximum (high borderline) Requirement
Low = Minimum (low borderline) Requirement

APPENDIX I

MAXIMUM OCTANE NUMER REQUIREMENTS
OF SELECT MODELS

TABLE I-I

MAXIMUM OCTANE NUMBER REQUIREMENTS - 1983 SELECT MODELS

MODEL: NGA 238A3/HGA 238A3/IGA 238A3/LGA 238A3

		FBRU			FBRSU		
Percent Satisfied	PRF ON	RON	MON	(R+M)/2	RON	MON	(R+M)/2
5	81.1	82.0	77.3	79.7	82.0	75.0	78.5
10	82.7	84.2	78.8	81.5	84.4	76.6	80.5
20	84.7	86.8	80.6	83.7	87.3	78.7	83.0
30	86.1	88.7	81.9	85.3	89.4	80.1	84.8
40	87.3	90.4	83.0	86.7	91.2	81.4	86.3
50	88.4	91.9	84.1	88.0	92.9	82.5	87.7
60	89.5	93.4	85.1	89.3	94.5	83.7	89.1
70	90.7	95.0	86.2	90.6	96.3	84.9	90.6
80	92.1	97.0	87.5	92.2	98.4	86.4	92.4
90	94.1	99.6	89.4	94.5	101.3	88.4	94.9
95	95.7	101.8	90.9	96.3	103.7	90.1	96.9

TABLE I-I
(Continued)

MAXIMUM OCTANE NUMBER REQUIREMENTS - 1983 SELECT MODELS

MODEL: NJP F20A3/LJP F20A3/GJP F20A3

Percent Satisfied	PRF ON	FBRU			FBRSU		
		RON	MON	(R+M)/2	RON	MON	(R+M)/2
5	87.7	91.2	83.5	87.3	91.4	81.4	86.4
10	88.6	92.0	84.1	88.0	92.5	82.1	87.3
20	89.7	93.1	84.8	88.9	93.7	83.0	88.4
30	90.5	93.8	85.2	89.5	94.7	83.6	89.2
40	91.2	94.4	85.7	90.0	95.5	84.2	89.8
50	91.8	95.0	86.0	90.5	96.2	84.7	90.4
60	92.4	95.6	86.4	91.0	96.9	85.2	91.1
70	93.1	96.2	86.9	91.5	97.7	85.7	91.7
80	93.9	96.9	87.3	92.2	98.7	86.4	92.5
90	95.0	98.0	88.0	93.0	100.0	87.3	93.6
95	95.9	98.8	88.6	93.7	101.0	88.0	94.5

TABLE I-I
(Continued)

MAXIMUM OCTANE NUMBER REQUIREMENTS - 1983 SELECT MODELS

MODEL: OA4 216A3/MA4 216A3

Percent Satisfied	PRF ON	FBRU RON	FBRU MON	FBRU (R+M)/2	FBRSU RON	FBRSU MON	FBRSU (R+M)/2
5	87.6	87.8	81.4	84.6	87.7	79.1	83.4
10	88.4	88.7	82.0	85.3	88.7	79.8	84.2
20	89.3	89.8	82.7	86.2	89.9	80.6	85.2
30	90.0	90.6	83.2	86.9	90.8	81.1	86.0
40	90.6	91.3	83.7	87.5	91.5	81.6	86.6
50	91.2	91.9	84.1	88.0	92.2	82.0	87.2
60	91.7	92.6	84.5	88.5	92.9	82.5	87.7
70	92.3	93.3	84.9	89.1	93.7	83.0	88.4
80	93.0	94.1	85.4	89.7	94.5	83.5	89.1
90	93.9	95.2	86.1	90.6	95.8	84.3	90.1
95	94.7	96.1	86.7	91.4	96.8	84.9	90.9

TABLE I-I
(Continued)

MAXIMUM OCTANE NUMBER REQUIREMENTS - 1983 SELECT MODELS

MODEL: OD3 238A3/OD3 238A4/MD3 238A3/OE3 238A3/OE3 238A4/ME3 238A4

Percent Satisfied	PRF ON	FBRU RON	FBRU MON	FBRU (R+M)/2	FBRSU RON	FBRSU MON	FBRSU (R+M)/2
5	81.5	83.1	78.2	80.7	83.5	76.0	79.8
10	82.8	84.4	79.0	81.7	84.8	76.9	80.9
20	84.4	85.9	80.1	83.0	86.3	78.0	82.2
30	85.5	87.0	80.8	83.9	87.5	78.8	83.2
40	86.5	88.0	81.4	84.7	88.5	79.5	84.0
50	87.4	88.8	82.0	85.4	89.4	80.1	84.8
60	88.3	89.7	82.6	86.2	90.3	80.7	85.5
70	89.2	90.7	83.3	86.9	91.2	81.4	86.3
80	90.4	91.8	84.0	87.9	92.4	82.2	87.3
90	91.9	93.3	85.0	89.1	93.9	83.3	88.6
95	93.2	94.6	85.9	90.2	95.2	84.2	89.7

TABLE I-I
(Continued)

MAXIMUM OCTANE NUMBER REQUIREMENTS - 1983 SELECT MODELS

MODEL: PKC 222A3/KKC 222A3/DKC 222A3/KEC 222A3/DEC 222A3

Percent Satisfied	PRF ON	FBRU RON	FBRU MON	FBRU (R+M)/2	FBRSU RON	FBRSU MON	FBRSU (R+M)/2
5	80.6	82.0	77.4	79.7	83.0	75.7	79.4
10	82.0	83.7	78.5	81.1	84.9	77.0	81.0
20	83.7	85.7	79.9	82.8	87.1	78.5	82.9
30	85.0	87.2	80.9	84.1	88.8	79.6	84.3
40	86.1	88.5	81.7	85.1	90.2	80.6	85.4
50	87.0	89.6	82.5	86.1	91.5	81.5	86.5
60	88.0	90.8	83.3	87.1	92.8	82.4	87.6
70	89.1	92.0	84.2	88.1	94.2	83.4	88.8
80	90.4	93.5	85.2	89.3	95.9	84.5	90.2
90	92.1	95.5	86.5	91.0	98.1	86.0	92.1
95	93.5	97.2	87.7	92.4	100.0	87.3	93.7

TABLE I-II

MAXIMUM OCTANE NUMBER REQUIREMENTS OF INDIVIDUAL CARS OF

1983 SELECT MODEL NGA 238A3/HGA 238A3/IGA 238A3/LGA 238A3

		FBRU			FBRSU			
i	PRF ON	RON	MON	(R+M)/2	RON	MON	(R+M)/2	Percent Satisfied
1	L	78.0	74.2	76.1	78.0	71.7	74.8	2.78
2	86.0	87.0	80.9	84.0	87.0	78.5	82.8	8.33
3	86.0	87.5	81.2	84.4	88.0	79.3	83.6	13.89
4	86.0	88.0	81.6	84.8	89.0	80.0	84.5	19.44
5	86.0	89.0	82.2	85.6	89.0	80.0	84.5	25.00
6	87.0	89.0	82.2	85.6	89.5	80.4	84.9	30.56
7	87.0	89.0	82.2	85.6	90.0	80.7	85.4	36.11
8	88.0	90.0	82.8	86.4	90.0	80.7	85.4	41.67
9	88.0	90.0	82.8	86.4	90.0	80.7	85.4	47.22
10	88.0	90.0	82.8	86.4	91.5	81.6	86.6	52.78
11	89.0	91.0	83.5	87.2	92.0	81.9	87.0	58.33
12	89.0	93.0	84.7	88.8	94.0	83.1	88.6	63.89
13	90.0	95.0	86.0	90.5	96.0	84.5	90.2	69.44
14	92.0	96.0	86.7	91.4	100.0	87.3	93.6	75.00
15	92.0	98.0	88.0	93.0	100.0	87.3	93.6	80.56
16	93.0	100.0	89.5	94.8	H	H	H	86.11
17	94.0	101.0	90.3	95.6	H	H	H	91.67
18	95.0	H	H	H	H	H	H	97.22
N	18		18			18		
Mean	88.389	91.899	84.067	87.978	92.861	82.533	87.700	
s	4.421	6.011	4.123	5.058	6.593	4.601	5.592	

TABLE I-II
(Continued)

MAXIMUM OCTANE NUMBER REQUIREMENTS OF INDIVIDUAL CARS OF

1983 SELECT MODEL NJP F20A3/LJP F20A3/GJP F20A3

		FBRU			FBRSU			
i	PRF ON	RON	MON	(R+M)/2	RON	MON	(R+M)/2	Percent Satisfied
1	87.0	90.0	82.8	86.4	90.0	80.7	85.4	2.27
2	87.0	92.0	84.1	88.0	92.0	81.9	87.0	6.82
3	88.0	93.0	84.7	88.8	93.0	82.5	87.8	11.36
4	89.0	93.0	84.7	88.8	94.0	83.1	88.6	15.91
5	91.0	94.0	85.4	89.7	94.0	83.1	88.6	20.45
6	91.0	94.0	85.4	89.7	94.0	83.1	88.6	25.00
7	92.0	94.0	85.4	89.7	95 0	83.8	89.4	29.55
8	92.0	94.0	85.4	89.7	95.0	83.8	89.4	34.09
9	92.0	94.0	85.4	89.7	96.0	84.5	90.2	38.64
10	92.0	94.0	85.4	89.7	96.0	84.5	90.2	43.18
11	92.0	95.0	86.0	90.5	96.0	84.5	90.2	47.73
12	92.0	95.0	86.0	90.5	96.0	84.5	90.2	52.27
13	92.0	95.0	86.0	90.5	96.0	84.5	90.2	56.82
14	92.0	95.0	86.0	90.5	96.0	84.5	90.2	61.36
15	92.0	95.0	86.0	90.5	97.0	85.2	91.1	65.91
16	92.0	95.0	86.0	90.5	97.0	85.2	91.1	70.45
17	92.0	96.0	86.7	91.4	98.0	85.9	92.0	75.00
18	94.0	97.0	87.3	92.2	99.0	86.6	92.8	79.55
19	94.0	98.0	88.0	93.0	100.0	87.3	93.6	84.09
20	94.0	98.0	88.0	93.0	100.0	87.3	93.6	88.64
21	96.0	99.0	88.8	93.9	100.0	87.3	93.6	93.48
22	97.0	100.0	89.5	94.8	H	H	H	97.83
N	22		22			22		
Mean	91.818	95.000	86.045	90.523	96.205	84.686	90.441	
s	2.481	2.309	1.537	1.939	2.922	2.014	2.445	

TABLE I-II
(Continued)

MAXIMUM OCTANE NUMBER REQUIREMENTS OF INDIVIDUAL CARS OF

1983 SELECT MODEL OA4 216A3/MA4 216A3

		FBRU			FBRSU			
i	PRF ON	RON	MON	(R+M)/2	RON	MON	(R+M)/2	Percent Satisfied
1	87.0	87.0	80.9	84.0	88.0	79.3	83.6	3.13
2	88.0	88.0	81.6	84.8	88.0	79.3	83.6	9.38
3	89.0	90.0	82.8	86.4	90.0	80.7	85.4	15.63
4	89.0	91.0	83.5	87.2	90.0	80.7	85.4	21.88
5	90.0	91.0	83.5	87.2	90.0	80.7	85.4	28.13
6	90.5	91.0	83.5	87.2	90.0	80.7	85.4	34.38
7	91.0	91.0	83.5	87.2	91.0	81.3	86.2	40.63
8	91.0	92.0	84.1	88.0	93.0	82.5	87.8	46.88
9	92.0	92.0	84.1	88.0	93.0	82.5	87.8	53.13
10	92.0	92.0	84.1	88.0	93.0	82.5	87.8	59.38
11	92.0	92.0	84.1	88.0	94.0	83.1	88.6	65.63
12	92.0	94.0	85.4	89.7	94.0	83.1	88.6	71.88
13	93.0	94.0	85.4	89.7	94.0	83.1	88.6	78.13
14	93.0	94.0	85.4	89.7	94.5	83.4	89.0	84.38
15	94.0	95.0	86.0	90.5	95.0	83.8	89.4	90.63
16	95.0	97.0	87.3	92.2	98.0	85.9	92.0	96.88
N	16		16			16		
Mean	91.156	91.938	84.075	87.975	92.219	82.038	87.163	
s	2.173	2.516	1.603	2.075	2.763	1.763	2.279	

TABLE I-II
(Continued)

MAXIMUM OCTANE NUMBER REQUIREMENTS OF INDIVIDUAL CARS OF

1983 SELECT MODEL OD3 238A3/OD3 238A4/MD3 238A3/OE3 238A3/OE3 238A4/ME3 238A4

		FBRU			FBRSU			
i	PRF ON	RON	MON	(R+M)/2	RON	MON	(R+M)/2	Percent Satisfied
1	78.0	79.0	75.0	77.0	80.0	73.2	76.6	2.38
2	82.0	84.0	78.9	81.4	86.0	77.8	81.9	7.14
3	82.0	85.0	79.6	82.3	86.0	77.8	81.9	11.90
4	84.0	86.0	80.3	83.2	86.0	77.8	81.9	16.67
5	86.0	87.0	80.9	84.0	86.0	77.8	81.9	21.43
6	86.0	87.5	81.2	84.4	87.0	78.5	82.8	26.19
7	86.0	88.0	81.6	84.8	88.0	79.3	83.6	30.95
8	87.0	88.0	81.6	84.8	88.5	79.6	84.1	35.71
9	87.0	88.0	81.6	84.8	89.0	80.0	84.5	40.48
10	87.0	89.0	82.2	85.6	89.0	80.0	84.5	45.24
11	88.0	90.0	82.8	86.4	89.0	80.0	84.5	50.00
12	89.0	90.0	82.8	86.4	90.0	80.7	85.4	54.76
13	89.0	90.0	82.8	86.4	90.0	80.7	85.4	59.52
14	89.0	90.0	82.8	86.4	91.0	81.3	86.2	64.29
15	89.5	90.0	82.8	86.4	91.0	81.3	86.2	69.05
16	90.0	91.0	83.5	87.2	91.0	81.3	86.2	73.81
17	90.0	91.0	83.5	87.2	93.0	82.5	87.8	78.57
18	90.0	92.0	84.1	88.0	93.0	82.5	87.8	83.33
19	91.0	92.0	84.1	88.0	93.0	82.5	87.8	88.10
20	91.0	93.0	84.7	88.8	94.0	83.1	88.6	92.86
21	93.0	95.0	86.0	90.5	96.0	84.5	90.2	97.62
N	21		21			21		
Mean	87.357	88.833	82.038	85.429	89.357	80.105	84.752	
s	3.568	3.476	2.339	2.895	3.575	2.479	3.035	

TABLE I-II
(Continued)

MAXIMUM OCTANE NUMBER REQUIREMENTS OF INDIVIDUAL CARS OF

1983 SELECT MODEL PKC 222A3/KKC 222A3/DKC 222A3/KEC 222A3/DEC 222A3

			FBRU				FBRSU			
i	PRF ON	Percent Satisfied	RON	MON	(R+M)/2	Percent Satisfied	RON	MON	(R+M)/2	Percent Satisfied
1	78.0	2.50	78.0	74.2	76.1	2.38	79.5	72.8	76.2	2.50
2	79.0	7.50	81.0	76.6	78.8	7.14	83.0	75.7	79.4	7.50
3	82.0	12.50	86.0	80.3	83.2	11.90	86.0	77.8	81.9	12.50
4	84.0	17.50	87.0	80.9	84.0	16.67	89.0	80.0	84.5	17.50
5	85.0	22.50	87.0	80.9	84.0	21.43	89.0	80.0	84.5	22.50
6	86.0	27.50	88.0	81.6	84.8	26.19	89.0	80.0	84.5	27.50
7	87.0	32.50	88.0	81.6	84.8	30.95	89.5	80.4	84.9	32.50
8	87.0	37.50	88.0	81.6	84.8	35.71	90.0	80.7	85.4	37.50
9	87.0	42.50	89.0	82.2	85.6	40.48	90.0	80.7	85.4	42.50
10	87.0	47.50	89.0	82.2	85.6	45.24	91.0	81.3	86.2	47.50
11	87.0	52.50	89.0	82.2	85.6	50.00	91.0	81.3	86.2	52.50
12	88.0	57.50	90.0	82.8	86.4	54.76	92.0	81.9	87.0	57.50
13	89.0	62.50	90.0	82.8	86.4	59.52	92.0	81.9	87.0	62.50
14	89.0	67.50	91.0	83.5	87.2	64.29	94.0	83.1	88.6	67.50
15	90.0	72.50	92.0	84.1	88.0	69.05	96.0	84.5	90.2	72.50
16	90.0	77.50	93.0	84.7	88.8	73.81	96.0	84.5	90.2	77.50
17	91.0	82.50	94.0	85.4	89.7	78.57	97.0	85.2	91.1	82.50
18	91.0	87.50	94.0	85.4	89.7	83.33	98.0	85.9	92.0	87.50
19	92.0	92.50	96.0	86.7	91.4	88.10	98.0	85.9	92.0	92.50
20	92.0	97.50	96.0	86.7	91.4	92.86	100.0	87.3	93.6	97.50
21			96.0	86.7	91.4	97.62				
N	20			21				20		
Mean	87.050		89.619	82.529	86.081		91.500	81.500	86.540	
s	3.927		4.610	3.120	3.865		5.173	3.548	4.348	

APPENDIX J

SPEED RANGE DATA

TABLE J-1

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	SPK ADV AS TST	ODOM MILES	AMB TMP	BAROM	HUM	PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM 1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
1	29	BA7 F17M5	F	N	8.2	N	+ 6	+ 6	6087	70	30.29	60	82.0	84.5	86.5	86.5	86.0	85.5	85.0	84.5	84.5	84.0	84.0	
30	4	BA8 F18M5	F	N	8.5	Y	+ 6	+ 6	9891	87	29.18	71	82.0	83.0	83.5	84.0	84.0	84.0	83.5	83.5	83.0	82.5	82.5	82.0
33	4	DEC 222A3	F	N	9.0	Y	+10	+10	7745	79	29.24	101			85.5	86.5	87.0	87.0	86.5	86.0	85.0	84.5	83.5	82.5
284	28	DKC 222A3	F	N	9.0	Y	+10	+10	20175	70	29.36	50				81.0	88.0	89.0	85.0	83.0	82.0	79.0	80.5	78.5
256	8	DKG 226A3	F	N	8.2	Y	+ 7	+ 7	14624	75	28.77	53							80.0	79.5	78.0	77.0	76.0	
41	4	GC8 F41A4	F	N	8.5	Y	+10	+10	6864	88	29.23	85		80.5	81.5	82.0	82.0	82.0	82.0	81.5	81.0	80.5	80.0	79.0
277	8	GC8 F41A4	F	N	8.5	Y	+10	+10	6152	86	29.85	95			81.5	83.5	81.5							
90	5	GK8 F41A4	F	N	8.5	Y	+10	+10	7042	70	30.00	61			82.0	84.5	85.0	84.0	83.0	82.0	81.5	81.0	80.5	80.0
315	26	HAR F25A3	F	N	8.2	Y	+ 8	+ 8	7824	71	29.86	68			87.0	87.0	85.0	85.0	85.0	85.0	85.0			
38	4	HGA 238A3	F	N	8.0	Y	+15	+15	7686	82	28.94	75			86.0	87.0	86.5	84.5	83.0	81.5	80.5	80.0	79.5	
335	7	HGA 238A3	F	N	8.0	Y	+15	+15	16471	70	30.24	64		84.0	87.0	89.4	90.0	88.0	86.3	84.5				
58	41	HJO F18A3	C	N	9.0	Y	+ 8	+ 8	14895	75	29.94	81							86.0	87.5	88.0	87.0		
242	46	HTC 216A3	F	N	8.6		+ 6	+ 6	18935	79	29.40	85					85.0	85.0	83.0	82.0				
271	8	IAE 230A3	F	N	8.5	Y	+15	+15	15490	75	30.11	58						84.0	84.5	84.5	84.0	83.5	83.0	82.0
59	41	IAR F25A3	C	N	8.2	Y	+ 8	+ 8	8390	71	30.08	69					85.5	87.5	88.0	86.0	84.0			
243	46	IAR F25A3	F	N	8.2	Y	+ 8	+ 8	9155	73	29.52	74							82.0	85.0	83.0			
87	5	IBY 450A3	F	N	8.0	Y	+20	+20	7925	71	28.97	55				89.0	87.0	85.5	85.0	85.0	84.0			
244	46	IBY 450A4	F	N	8.0	Y	+20	+20	10752	74	28.33	63				84.0	87.0	87.0	85.0					
245	46	IBY 450A4	F	N	8.0	Y	+20	+20	7393	76	28.34	62				83.0	85.0	83.0						
317	26	IBY 450A4	F	N	8.0	Y	+20	+20	12014	79	30.08	65		87.0	88.0	88.0	87.5	85.5	83.0					
88	5	ICY 450A4	F	N	8.0	Y	+16	+20	17180	71	29.95	60				87.0	86.5	85.0	84.0	83.5	82.5	81.5		
336	7	IEY 450A4	F	N	8.0	Y	+20	+20	12843	70	30.30	60			84.5	86.0	87.0	87.3	86.0	84.6	83.2	82.0	81.0	

TABLE J-1
(Continued)

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	AS TST	ODOM MILES	AMB TMP	BAROM	HUM	PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM 1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
60	41	IGA 238A3	C	N	8.0	Y	+13	+15	13040	72	29.96	72			87.0	88.0	87.0	85.5						
246	46	IGA 238A3	F	N	8.0	Y	+15	+15	17204	80	29.38	104				83.0	86.0	85.0						
247	46	IGA 238A3	F	N	8.0	Y	+15	+15	15477	74	29.40	64				83.0	87.0	85.0						
272	8	IGA 238A3	F	N	8.0	Y	+15	+15	10788	70	30.24	29				85.5	86.0	85.0	84.0	83.0	82.5			
273	8	IGA 238A3	F	N	8.0	Y	+15	+15	22520	75	29.95	77				88.0	86.0	84.5						
318	26	IGY 450A3	F	N	8.00	Y	+20	+20	14429	77	29.85	100		80.5	87.0	87.0	86.0							
39	4	IGY 450A4	F	N	8.0	Y	+20	+20	7742	96	29.00	108			83.0	85.5	86.0	84.0	82.0	80.5	79.0	78.0	77.5	
14	29	IJO F18A3	F	N	9.0	Y	+ 8	+ 8	26055	70	30.06	60					86.5	89.0	90.0	91.0	89.0	85.5	84.0	
89	5	IXR F25A3	F	N	8.2	Y	+ 8	+ 8	24867	70	29.91	52					87.5	88.5	90.0	91.0	90.5	90.0	88.5	87.0
248	46	IXR F25A3	F	N	8.2	Y	+ 8	+ 8	6200	76	29.65	80						81.0	84.0	82.0				
274	8	IXR F25A3	F	N	8.2	Y	+ 8	+ 8	11645	75	29.97	37							82.0	84.5	82.0	80.5		
32	4	KKC 222A3	F	N	9.0	N	+10	+10	5616	87	29.10	118			84.5	86.0	87.0	87.0	86.5	86.0	85.0	84.5	84.0	83.0
75	5	KKC 222A3	F	N	9.0	Y	+10	+10	4055	70	29.88	52					88.0	86.5	85.5	85.0	84.5	84.0	84.0	83.5
235	46	KKC 222A3	F	N	9.0	Y	+ 9	+ 9	17872	76	29.42	70	L			76.0	77.5	78.0	78.0	76.0				
255	8	KKC 222A3	F	N	9.0	Y	+10	+10	6070	70	29.91	40					82.0	82.5	82.0	81.5	80.5	80.0	79.0	78.5
301	26	KKC 222A3	F	N	9.0	Y	+10	+10	16207	83	29.94	118	85.0	86.5	87.0	87.0	87.0	86.5	85.5	85.0	84.0	82.5	81.0	80.0
328	7	KKC 222A3	F	N	9.0	Y	+10	+10	14465	70	30.40	56						87.5	90.0	88.4	87.4	86.7	86.0	85.7
40	4	LAE 230A3	F	N	8.5	Y	+14	+14	13770	75	29.13	91			89.0	87.5	87.0	86.0	85.5	85.0	84.5	84.0	83.5	83.5
294	28	LAE 230A3	F	N	8.5	Y	+15	+15	15139	70	29.36	50			86.0	87.0	86.0							
319	26	LAE 230A3	F	N	8.5	Y	+15	+15	5132	78	29.82	97		86.0	86.0	83.0								
15	29	LAE 230A4	F	N	8.5	Y	+15	+15	12200	70	30.07	59					82.0	81.5	81.0	79.5	78.5			
16	29	LAE 230A4	F	N	8.5	Y	+15	+15	6555	70	30.29	59					85.0	84.0	82.5	81.5	80.0			

TABLE J-1
(Continued)

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	SPK ADV AS TST	ODOM MILES	AMB TMP	BAROM	HUM	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
													PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM											
339	7	LAR F25A3	F	N	8.2	Y	+ 8	+ 8	15755	70	30.02	62						84.0	87.5	90.0	89.0	86.8	85.0	84.0
249	46	LCY 450A4	F	N	8.0	Y	+20	+20	12912	74	29.28	82		82.0	84.0	82.0								
61	41	LGA 238A3	C	N	8.0	Y	+15	+15	7187	71	30.06	78			86.0	89.0	86.0							
275	8	LGA 238A3	F	N	8.0	Y	+15	+15	23829	80	29.48	84				82.5	81.0	78.5	78.5					
276	8	LGA 238A3	F	N	8.0	Y	+15	+15	21015	75	30.06	45				86.0	85.0	83.0	82.0	81.0	80.0			
337	7	LGA 238A3	F	N	8.0	Y	+15	+15	11225	71	30.00	59	84.0	85.8	88.0	87.0	85.5	85.0	84.6	84.2				
17	29	LJP F20A3	F	N	9.3	Y	+10	+10	7915	70	29.94	60						91.0	91.5	90.5	89.0	88.0	87.0	
338	7	LJP F20A3	F	N	9.3	Y	0	0	6268	71	30.28	62								90.0	92.0	91.4	90.0	89.0
62	41	LXR F25A3	C	N	8.2	Y	+ 8	+ 8	7545	72	30.16	67				85.0	86.0	86.5	87.0	87.0	86.5	86.0	85.0	
295	28	LXR F25A3	F	N	8.2	Y	+ 8	+ 8	16090	70	29.38	50						84.0	88.0	86.5	84.5	83.0	81.0	
320	28	LXX 228A3	F	N	8.5	Y	+10	+10	13277	74	30.12	42		89.0	89.0	88.0	87.0	86.0	85.0	84.0	83.0	82.0		
239	46	MA2 216A3	F	N	9.0	Y	+10	+10	13741	75	29.34					85.0	87.0	86.0	85.0					
260	8	MA2 216A3	F	N	9.0	Y	+10	+10	18809	67	29.85	66			89.0	89.0	88.5	88.0	87.5	86.5	86.0			
261	8	MD3 238A3	F	N	8.6	Y	+10	+10	6044	75	29.92	86		78.5	80.5	83.0	85.0							
79	5	ME3 238A4	F	N	8.8	Y	+12	+12	4147	70	30.18	58		86.5	87.0	86.0	85.5	85.0	85.0	84.5	83.5	83.0	82.0	82.0
262	8	NAR F25A3	F	N	8.2	Y	+ 8	+ 8	13808	78	29.78	97							84.0	83.5	82.0	80.5	79.0	
263	8	NAR F25A3	F	N	8.2	Y	+ 8	+ 8	16247	75	29.99	77							86.0	85.5	83.5	82.0	80.0	
10	29	NAX 228A3	F	N	8.5	Y	+10	+10	6010	70	29.92	62		83.5	85.0	87.0	88.0	87.5	87.0	84.0				
52	41	NAX 228A3	C	N	8.5	Y	+10	+10	9692	72	29.93	68					84.0	85.0	86.0	86.0	85.0			
264	8	NAX 228A3	F	N	8.5	Y	+10	+10	11804	76	29.95	39							86.0	86.0	85.0	83.0	82.5	82.0
80	5	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	8992	70	30.00	54	88.0	88.0	88.0	88.0	88.0	87.5	87.5	87.0	87.0	86.5	86.0	
265	8	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	8758	70	30.35	29					84.0	83.5	83.0	82.0	81.5	80.5		

TABLE J-1
(Continued)

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	SPK ADV AS TST	ODOM MILES	AMB TMP	BAROM	HUM	PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM 1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
266	8	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	10180	86	29.64	107	82.0	86.0	86.0	86.0	85.5	85.5	85.0	84.5	84.0	82.5		
305	26	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	7522	75	30.25	92	91.0	91.0	90.5	90.0	89.0	88.0	87.0	86.5	85.5	85.0	85.0	
306	26	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	31958	78	29.98	86			86.0	87.0	86.5	85.0						
332	7	NBH 450A4	F	N	8.6	Y	+ 6	+ 6	14761	72	30.36	56				84.0	89.0	88.6	87.6	86.4	85.3	84.1	83.0	
53	41	NF1 228A3	C	N	8.5	Y	+10	+10	12274	81	29.94	82								87.0	91.0	92.0	91.0	87.0
81	5	NF1 228A3	F	N	8.5	Y	+10	+10	8596	70	28.85	52				93.5	94.0	91.5	90.5	89.5	89.0	88.0	87.5	87.0
307	26	NF1 228A3	F	N	8.5	Y	+10	+10	18900	80	29.98	136			88.0	87.5								
333	7	NF1 228A3	F	N	8.5	Y	+10	+10	6998	70	30.52	62					88.0	88.2	87.5	86.9	86.3	85.8	85.0	84.3
54	41	NGA 238A3	C	N	8.0	Y	+15	+15	9467	73	30.16	65			86.0	87.0	85.0							
308	26	NG9 238A3	F	N	8.6	Y	0	0	21370	83	29.97	124	87.0	88.5	90.0	90.0	88.0	87.0	86.5	86.0	85.0	83.5	82.0	
309	26	NG9 238A3	F	N	8.6	Y	0	0	25110	84	30.16	116	86.0	89.0	90.0	90.0	88.0							
310	26	NG9 238A3	F	N	8.6	Y	0	0	9945	80	30.04	116			91.0	93.0	92.5	90.5	87.0					
311	26	NG9 238A3	F	N	8.6	Y	0	0	19386	79	29.98	80		87.5	88.0	88.0	84.0							
314	26	NG9 238A3	F	N	8.6	Y	0	0	4423	64	30.05	24		90.5	92.0	93.0	93.0	89.0						
11	29	NJP F20A3	F	N	9.3	Y	0	0	24870	70	29.91	60				86.0	86.5	87.0	88.0	92.0	92.0			
35	4	NJP F20A3	F	N	9.3	N	0	0	6327	88	29.09	65			96.0	94.0	92.0	92.0	91.5	91.0	90.0	89.0	88.0	87.0
55	41	NJP F20A3	C	N	9.3	Y	0	0	7102	76	30.06	80							86.0	87.5	87.5	86.5		
82	5	NJP F20A3	F	N	9.3	Y	0	0	6638	70	30.70	48				94.0	93.0	92.0	91.5	91.0	90.5	90.0	90.0	90.0
83	5	NJP F20A3	F	N	9.3	Y	0	0	5016	70	30.10	58			97.0	95.5	94.5	93.5	93.0	93.0	92.5	92.0	92.0	91.0
84	5	NJP F20A3	F	N	9.3	Y	0	0	9210	71	30.03	55				89.0	89.0	89.0	88.5	88.0	88.0	87.5	87.0	86.5
267	8	NJP F20A3	F	N	9.3	Y	0	0	7918	80	29.70	100								87.0	87.0	86.5	86.0	85.0
268	8	NJP F20A3	F	N	9.3	Y	0	0	9984	71	29.87	43							85.5	87.0	86.0			

TABLE J-1
(Continued)

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	SPK ADV AS TST	ODOM MILES	AMB TMP	BAROM	HUM	PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM 1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
289	28	NJP F20A3	F	N	9.3	Y	0	0	12498	70	29.02	50				89.0	92.0	91.0	90.0	88.5	85.5	84.0	83.5	83.0
290	28	NJP F20A3	F	N	9.3	Y	0	0	10482	70	29.25	50						86.0	91.0	92.0	88.8	87.2	86.0	84.5
291	28	NJP F20A3	F	N	9.3	Y	0	0	23841	70	29.23	50							94.5	93.5	92.5	92.0	89.0	85.5
292	28	NJP F20A3	F	N	9.3	Y	0	0	15065	70	29.43	50						89.0	93.0	94.0	90.0			
312	26	NJP F20A3	F	N	9.3	Y	0	0	12415	73	30.27	66			91.0	91.0	90.5	90.5	91.5	92.0	92.0	91.5	90.5	
313	26	NJP F20A3	F	N	9.3	Y	0	0	13910	82	29.91	108				91.5	90.0	85.0						
334	7	NJP F20A3	F	N	9.3	Y	0	0	8873	70	29.94	60				87.0	92.5	92.3	91.4	90.5	89.8	89.0	88.5	88.1
85	5	NJP F20M4	F	N	9.3	Y	0	0	4014	69	29.90	50			88.0	87.0	86.0	85.0	85.0	84.5	84.0	84.0	84.0	83.0
12	29	NTC 216A3	F	N	9.4	N	+ 6	+ 6	13066	72	30.22	65				88.0	87.0	85.5	85.0	84.5	84.0			
13	29	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	6968	70	29.97	61					86.0	86.0	86.0	85.5	84.5	83.5		
36	4	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	7004	81	29.33	97			78.0	80.5	82.0	81.5	81.0	80.5	80.0	79.5	78.5	78.0
56	41	NTC 216A3	C	N	9.4	Y	+ 6	+ 6	11397	63	30.06	68						84.5	86.0	86.0	85.0			
86	5	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	13865	70	29.92	54			86.0	87.0	87.0	88.0	90.0	88.5	87.5	87.0	87.0	86.0
269	8	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	19864	80	29.86	41			82.0	84.0	83.5	83.0	82.5	81.5	80.0			
293	28	NTC 216A3	F	N	9.4	Y	+ 6	+ 6	9624	70	29.53	50				80.0	83.0	84.0	83.0	82.0				
57	41	NXR F25A3	C	N	8.2	Y	+ 8	+ 8	19885	77	30.06	83						94.5	96.0	94.5	94.0			
240	46	NXR F25A3	F	N	8.2	Y	+ 2	+ 8	17990	75	29.49	82							83.0	85.0	83.0			
270	8	NXR F25A3	F	N	8.2	Y	+ 8	+ 8	18157	76	29.72	90						83.5	86.0	85.5	83.5	82.5		
236	46	OA2 216A3	F	N	9.0	Y	+10	+10	12550	74	29.15	64				88.0	89.0	89.0	88.0					
329	7	OA2 216A3	F	N	9.0	Y	+10	+10	18173	72	30.23	65					90.0	92.0	91.8	89.8	88.0	87.9	86.0	85.8
6	29	OA4 216A3	F	N	9.0	Y	+14	+14	10695	70	30.07	58		95.0	94.0	92.5	90.5	86.5						
34	4	OA4 216A3	F	N	9.0	Y	+14	+14	5302	79	29.32	102		83.5	85.5	87.0	88.0	87.0	86.0	85.0	84.5	84.0	84.0	83.5

TABLE J-1
(Continued)

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	SPK ADV AS TST	ODOM MILES	AMB TMP	BAROM	HUM	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
													PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM											
48	41	0A4 216A3	C	N	9.0	Y	+14	+14	6178	74	30.05	69		89.0	90.5	91.0	91.0	90.5	90.0	89.0				
76	5	0A4 216A3	F	N	9.0	Y	+14	+14	7161	70	30.30	52		90.0	91.0	92.0	92.0	90.5	89.0	88.5	87.5	87.0	86.5	86.0
77	5	0A4 216A3	F	N	9.0	Y	+14	+14	5896	70	30.00	54		93.0	93.5	94.0	93.0	92.5	92.5	92.0	92.0	91.5	91.5	91.0
257	8	0A4 216A3	F	N	9.0	N	+14	+14	21081	70	29.66	53						88.0	87.5	85.5	84.0	83.0	82.5	
285	28	0A4 216A3	F	N	9.0	Y	+14	+14	11785	70	29.51	50	84.0	87.0	87.0	85.0	84.0	84.0						
330	7	0A4 216A3	F	N	9.0	Y	+14	+14	8777	71	30.40	61						87.5	89.3	91.0	92.0	91.5	89.4	87.9
49	41	0A4 216M5	C	N	9.0	Y	+12	+12	6236	71	30.04	69			88.0	88.5	89.0	89.0	88.5	88.0	87.5	86.5	86.0	
7	29	0A5 F16M5	F	N	9.0	Y	+15	+15	23831	70	29.91	60	87.0	88.5	91.0	91.0	91.0	89.5	89.0	88.5	88.0	86.5	85.0	83.5
286	28	0A5 F16M5	F	N	9.0	Y	+10	+10	10341	70	29.36	50			85.0	86.0	84.0	83.0	82.0					
287	28	0A5 F16M5	F	N	9.0	Y	+15	+15	9540	70	29.29	50			86.0	89.2	85.7	84.2	83.5	82.5	81.5	80.0	79.2	77.5
302	26	0CX 133A3	F	N	8.6	Y	+10	+10	9314	74	30.17	104			89.0	89.0	89.0	88.5	88.5	88.0	87.5	87.5	87.0	
50	41	0D3 238A3	C	N	8.6	Y	+10	+10	13942	83	29.97	68					86.5	88.0	89.0	89.5	89.0	88.0	86.5	
78	5	0D3 238A3	F	N	8.6	Y	+10	+10	10685	70	30.10	54		86.0	87.5	89.0	89.0	88.5	88.0	86.5				
258	8	0EX 133A3	F	N	8.6	Y	+10	+10	11609	80	30.31	37				88.5	91.0	90.0	89.0	87.5	86.0			
9	29	0E3 238A3	F	N	8.6	Y	+12	+12	13056	72	30.22	65				87.0	86.0	85.0	84.5	84.0	83.5			
51	41	0E3 238A3	C	N	8.6	Y	+16	+10	21297	70	30.02	61			85.5	86.0	86.0	85.5	85.0	84.5	84.0			
259	8	0E3 238A3	F	N	8.6	Y	+12	+12	17128	74	29.98	69		81.0	82.0	81.0	80.5	79.5	78.5					
8	29	0E3 238A4	F	N	8.6	Y	+12	+12	12617	70	30.06	62			85.0	84.5	84.0	84.0	83.5	83.5	82.0			
238	46	0E3 238A4	F	N	8.6	Y	+12	+12	7661	74	29.30	104						79.0	82.0	79.0				
288	28	0E3 238A4	F	N	8.6	Y	+12	+12	15266	70	29.53	50		84.0	90.0	86.0	85.0	84.0						
303	26	0E3 238A4	F	N	8.6	Y	+12	+12	4823	68	29.77	56	88.0	88.0	88.0	86.0	85.0	84.5	84.0	84.0				
331	7	0E3 238A4	F	N	8.6	Y	+ 8	+12	9104	70	30.41	59	84.3	85.0	86.1	88.0	90.0	89.8	88.2	87.0	86.0	85.0	84.3	83.9

TABLE J-1
(Continued)

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	SPK ADV AS TST	ODOM MILES	AMB TMP	BAROM	HUM	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
													PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM											
37	4	OFF F50A4	F	N	8.4	Y	+20	+20	6726	77	29.35	64	88.0	90.0	91.5	92.0	91.5	91.0	90.0	89.0	88.0	87.0	85.5	84.5
304	26	OFF F50A4	F	N	8.4	Y	+20	+20	6865	87	29.97	124	89.0	89.0	88.5	88.0	88.0	87.5	87.0	86.0	85.5	84.5	84.0	
46	41	PKC 222A3	C	N	9.0	Y	+10	+10	18687	72	30.00	72			83.0	85.0	86.5	87.0	87.0	86.5	85.0	83.5		
47	41	PKC 222A3	C	N	9.0	Y	+ 8	+10	9075	74	30.08	78				87.0	89.0	88.5	87.0					
74	5	PKC 222A3	F	N	9.0	Y	+10	+10	8945	70	29.93	54					85.0	85.0	85.0	84.5	84.0	83.5	83.0	82.0
254	8	PKC 222A3	F	N	9.0	Y	+10	+10	16103	74	29.75	60					84.0	84.0	82.0	80.5	79.5	79.0	78.0	
300	26	PKC 222A3	F	N	9.0	Y	+10	+10	18146	80	30.07	84			83.0	87.0	86.5	86.0	85.5	85.0	85.0	85.0	84.5	83.0
327	7	PKC 222A3	F	N	9.0	Y	+10	+10	11570	70	30.14	56						89.5	92.6	91.0	89.4	87.8	87.0	86.2
5	29	PLC 222A3	F	N	9.0	Y	+10	+10	10413	70	30.32	58	83.5	85.0	86.5	88.5	89.0	87.0	85.0	83.5				
31	4	PLC 222A3	F	N	9.0	Y	+10	+10	6434	73	29.30	66			87.0	90.0	89.5	88.5	87.0	86.0	85.0	84.0	83.0	82.5
2	29	RA6 F14A3	F	N	8.8	Y			17802	70	30.29	58						92.0	92.0	92.0	90.0	87.5	87.0	86.5
45	41	RA6 F14A3	C	N	8.8	Y			15197	72	30.06	67									85.0	86.0	85.5	85.0
251	8	RA6 F14A3	F	N	8.8	Y			6456	72	29.31	23								85.0	86.5	86.0	85.0	84.0
281	28	RA6 F14A3	F	N	8.8	Y			10449	70	29.16	50					85.0	85.5	84.5	84.1	83.2	82.0	81.2	78.5
282	28	RA6 F14A3	F	N	8.8	Y			10615	70	29.30	50			83.0	85.0	86.0	85.0	84.0	82.0				
283	28	RA6 F14M5	F	N	8.8	Y			17701	70	29.32	50			89.0	90.0	89.0	86.5	85.5	84.5	83.5	82.5	81.5	80.5
363	40	RA6 F14M5	A	N	8.8	N			9020	44	29.76	21							89.0	91.0	92.0	91.5	90.0	88.5
364	40	RA6 F14M5	A	N	8.8	N			22500	60	29.98	90			90.0	92.0	93.0	92.5	92.0	91.5	91.0	90.0	89.5	
3	29	RC5 242A3	F	N	9.2	Y	+ 6	+ 6	20000	70	29.92	60			88.5	92.0								
252	8	RC5 242A3	F	N	9.2	Y	+ 6	+ 6	20674	70	30.10	40				83.0	84.0	83.5	82.5	81.5	80.5	80.0		
64	41	NTLH 450A3	C	N	8.6	Y	+ 4	+ 6	9487	90	29.97	30			90.0	91.0	92.0	92.0	92.0	91.0	90.0			
341	7	NTSB 228A3	F	N	8.5	Y	+12	+12	8049	71	30.32	60		95.6	93.5	90.8				85.0	88.8	91.5	89.0	86.8

TABLE J-1
(Continued)

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	SPK ADV AS TST	ODOM MILES	AMB TMP	BAROM	HUM	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
													PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM											
42	4	OTLA 123A3	F	N	9.0	N	+ 8	+ 8	8068	78	29.16	82			82.0	84.0	85.5	86.5	87.5	88.0	86.5	85.0	83.5	82.5
340	7	OTLY 149A3	F	N	8.9	N	+14	+10	5036	71	30.28	57					87.2	91.4	89.8	88.0	88.2	85.0	84.0	
321	26	OTMG V258A3F	N		8.3	Y	+19	+19	10411	79	29.98	138								88.5	89.0			
63	41	OTMY 149M4	C	N	8.9	N			7527	72	30.00	72		90.5	91.0	91.0	90.5	90.0						
91	5	OVHG V258A3F	N		8.3	Y	+ 8	+ 8	5029	75	29.90	56			86.5	89.0	90.0	88.0	87.0	87.0	86.5	86.5	86.0	85.0
92	5	OVMI 250A4	F	N	8.4	Y	+ 8	+ 8	10239	72	30.00	62		91.0	89.0	89.0	88.5	88.0	87.5	87.0	86.5	86.0	85.0	84.0
93	5	C 216M4	F	N	8.5	Y	+ 5	+ 5	32015	69	30.62	50		91.5	92.0	91.5	90.0	88.0	87.5	86.5	86.0	85.0	84.5	
342	7	CP 222M5	F	N	9.0	N	+ 8	+10	6177	70	30.10	61				90.0	91.2	90.0	88.8	87.3	86.3	85.5	84.9	84.3
322	26	E 216A3	F	N	9.4	Y	- 5	- 5	8494	85	29.95	88					90.0	91.0	90.5	90.0	90.0	90.0	90.0	90.0
343	7	E 216A3	F	N	9.4	Y	+ 5	+ 5	5886	72	29.90	58					86.0	89.3	88.6	87.8	87.0	86.4	85.8	85.2
18	29	E 216M5	F	N	9.4	Y	+ 5	+ 5	9646	70	30.32	58	95.5	94.0	92.5	91.5	90.0	89.0	88.0	86.5				
19	29	E 216M5	F	N	9.4	Y	+ 5	+ 5	7688	70	29.92	62	95.0	95.0	94.0	92.5	91.5	91.0	90.0	88.0				
65	41	E 216M5	C	N	9.4	N	- 2	- 2	21974	72	29.94	67		93.0	93.5	94.0	94.0	94.0	93.5	93.5	93.0	93.0	92.5	
20	29	E 220M5	F	N	8.5	Y	0	0	11579	70	29.97	80	95.5	83.5	82.0	81.5	81.0	80.5	80.0	80.0	80.0			
66	41	E F22A3	C	N	8.5	Y	+ 8	+ 8	6985	76	29.98	80					84.5	86.0	86.5	87.0	87.0	86.5	86.0	85.0
67	41	E F24M5	C	N	8.9	Y	+ 8	+ 8	8505	74	30.02	73					88.0	89.0	89.0	89.0	88.0			
21	29	E F28M5	F	N	8.3	Y	+ 8	+ 8	6264	70	30.07	59	96.0	94.0	92.0	90.5	89.0	88.0	87.5					
344	7	J 313M5	F	N	9.3	Y	+15	+20	16151	71	30.70	56			95.5	99.0	H	H	H	99.5	98.8	97.8	96.9	96.0
22	29	J 315M5	F	N	9.3	N	+18	+18	13066	74	29.88	68	94.0	93.5	92.0	91.0	90.0	88.5						
94	5	J 315M5	F	N	9.3	Y	+18	+18	7714	70	30.10	51			94.0	93.5	93.0	91.5	90.5	89.0	88.0	86.5	85.5	84.0
95	5	J 318A4	F	N	8.8	Y	+16	+16	5118	70	30.04	55					89.0	89.5	90.5	91.5	92.5	93.0	92.0	90.0
323	26	J 318A4	F	N	8.8	Y	+16	+16	10282	80	29.86	136							85.0	86.0	87.0	87.0	87.0	87.0

TABLE J-1
(Continued)

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	SPK ADV AS TST	ODOM MILES	AMB TMP	BAROM	HUM	PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM 1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
23	29	J 318M5	F	N	8.8	N	+ 2	+ 2	13203	70	29.97	60	95.0	93.5	91.5	88.5	85.0	83.0	82.0	80.5				
68	41	J 318M5	C	N	8.8	N	+10	+12	6874	79	30.10	75			87.5	88.0	87.5	87.0						
296	28	J 318M5	F	N	8.8	Y	+16	+16	10601	70	29.33	50			90.0	92.0	90.0	87.5	86.5	85.0	81.5	78.0	L	L
69	41	Q 216M5	C	N	9.0	Y	+ 8	+ 8	10775	77	30.01	78		89.0	90.0	90.0	90.0	89.5	89.0					
345	7	Q 218M4	F	N	8.7	Y	+ 9	+ 9	11096	72	29.96	64				82.5	84.5	86.0	86.9	87.5	87.3	86.5	85.7	84.8
278	8	T 215A3	F	N	9.0	Y	+ 5	+ 5	8238	75	29.20	49								85.5	84.5	83.5	82.5	82.0
24	29	T 215M5	F	N	9.0	Y	+ 5	+ 5	15035	70	30.32	58	95.0	97.0	96.5	94.5	93.0	91.5	91.0	90.0	89.5	89.0		
70	41	T 215M5	C	N	9.0	Y	+12	+ 5	10389	71	30.12	68			90.0	91.0	90.5							
96	5	T 215M5	F	N	9.0	N	+ 6	+ 6	7710	75	30.19	66			91.0	89.5	88.5	88.0	86.5	85.5	85.0	84.5	84.5	84.0
346	7	T 215M5	F	N	9.0	Y	+ 8	+ 5	810[illegible]	70	30.30	61			84.0	90.0	90.5	89.0	88.0	87.4	86.9	86.2	85.9	85.3
352	60	T 215M5	F	N	9.0	Y	+ 5	+ 5	12932	73	29.56	58				92.0	95.0	95.4	94.6	93.5	92.3	91.3	90.4	89.8
97	5	T 216A3	F	N	9.0	Y	+ 5	+ 5	14511	70	29.92	54					86.0	87.0	88.0	90.0	88.0	87.5	87.0	86.0
279	8	T 216A3	F	N	9.0	Y	+ 5	+ 5	9470	81	29.67	87							84.0	87.0	88.0	86.0	85.0	84.0
280	8	T 216A3	F	N	9.0	Y	+ 5	+ 5	13957	74	29.98	69							88.5	87.5	86.5	85.5	84.5	
324	26	T 216A3	F	N	9.0	Y	+ 5	+ 5	7583	77	30.00	100					89.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
353	60	T 216A3	F	N	9.0	Y	+ 8	+ 5	22817	71	30.08	56								87.0	90.0	88.3	87.0	85.8
43	4	T 216M4	F	N	9.0	Y	+ 5	+ 5	6062	86	28.93	95			91.0	91.0	90.5	90.0	89.0	88.5	87.5	86.5	85.5	84.5
71	41	T 216M5	C	N	9.0	N	+ 5	+ 5	12422	70	30.00	66			92.0	92.0	92.0	92.0	92.0	91.5	91.5	91.0	90.5	90.0
354	60	T 216M5	F	N	9.0	N	+ 7	+ 5	9813	72	30.40	66					90.1	90.2	89.6	89.0	88.3	87.5	86.9	86.2
25	29	T 224M5	F	N	9.0	Y	+ 5	+ 5	9130	70	30.06	62	94.0	94.0	93.0	90.5	88.5	87.0	85.0	82.5				
72	41	T 224M5	C	N	9.0	Y	+ 5	+ 5	11719	74	30.16	73			89.0	90.0	89.5	88.5	87.0					
347	7	T 224M5	F	N	9.0	N	+ 5	+ 5	13842	69	30.02	58			86.1	88.5	89.9	90.0	88.4	87.0	85.8	84.8	84.0	83.2

TABLE J-1
(Continued)

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	SPK ADV AS TST	ODOM MILES	AMB TMP	BAROM	HUM	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
													PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM											
355	60	T 224M5	F	N	9.0	Y	+ 3	+ 5	6768	68	30.10	60				86.2	92.0	91.8	90.0	88.7	87.8	86.9	86.3	86.0
26	29	T F28A4	F	N	8.8	Y	+ 8	+ 8	11621	70	29.86	62				88.5	90.0	89.5	87.5	86.5	85.0			
27	29	T F28A4	F	N	8.8	Y	+ 8	+ 8	11422	70	30.08	62					90.0	89.0	87.5	86.5	85.0	84.5		
297	28	T F28A4	F	N	8.8	Y	+10	+10	10469	70	29.56	50	L	L	L	77.0	81.0	77.0	76.0	75.0	L	L	L	L
298	28	T F28A4	F	N	8.8	Y	+10	+10	14846	70	29.46	50	L	L	L	L	L	77.0	78.0	79.0	76.0	L	L	L
299	28	T F28A4	F	N	8.8	Y	+10	+10	10801	70	29.34	50	L	L	L	L	L	76.0	77.0	77.0	76.0	L	L	L
365	40	T F28A4	F	N	8.8	Y	+10	+10	5590	35	29.92	14							81.0	82.5	83.5	82.5	81.0	79.5
325	26	X F18A3	F	N	9.3	Y	+15	+15	8790	66	30.23	60							89.0	91.0	91.0	90.0	89.0	
366	40	X F18M5	F	N	9.3	Y	+15	+15	10850	62	29.97	44				82.5	83.5	85.0	86.0	87.0	87.0	86.5	85.5	84.5
28	29	Z 215M4	F	N	9.0	N	+ 8	+ 8	8943	75	29.88	68	84.0	84.0	84.0	83.5	83.0	82.0	81.5	80.5				
98	5	ZR 411M5	F	N	9.4	Y	+20	+20	11428	72	30.09	66			L	76.5	77.0	78.0	78.5	78.5	80.0	81.0	80.5	L
367	40	ZR 411M5	F	N	9.4	Y	+20	+20	9800	38	29.49	20										81.0	81.0	80.5
99	5	ET 222M4	F	N	8.5	N	+ 4	+ 4	7670	70	30.23	52		93.0	93.0	91.0	90.0	89.5	89.0	88.5	88.0	87.5	87.5	87.0
29	29	KT 226A3	F	N	8.2	Y	+12	+12	6813	70	30.12	72				88.0	88.0	87.0	86.0	85.5	85.0	84.5	83.0	
73	41	TT 224M4	C	N	9.0	N	+ 5	+ 5	6609	81	29.88	76		90.0	91.0	91.5	91.5	91.0	91.0	90.0				
44	4	TT 224M5	F	N	9.0	Y	+ 5	+ 5	5915	83	29.09	63			89.0	88.5	88.0	87.5	87.0	88.0	85.5	84.5	84.0	83.0
326	26	TT 224M5	F	N	9.0	Y	+5	+5	11236	72	30.25	63		89.0	90.0	90.0	89.5	88.0	86.0	84.5	84.0	84.5	85.0	85.0
356	60	TT 224M5	F	N	9.0	N	+ 5	+ 5	15300	70	29.81	58				85.0	91.2	90.3	89.6	88.8	88.1	87.5	87.0	86.5
509	5	HGA 238A3	F	Y	8.0	Y	+13	+13	13722	70	30.13	50				90.0	80.0	77.5	L.					
501	41	IGA 238A3	C	Y	8.0	Y	+15	+15	6042	70	30.26	67			85.0	87.0	86.5	85.0						
519	28	LAE 230A3	F	Y	8.5	Y	+15	+15	15245	70	29.48	50	L	77.0	80.0	86.0	L	L	L	L	L	L	L	L
503	5	LGA 238A3	F	Y	8.0	Y	+12	+15	9570	73	30.10	47			86.0	88.5	90.0	85.0	83.0	80.5	79.0	78.0		

TABLE J-1
(Continued)

OBS NO	LAB NO	MODEL CODE	EMCT	KSEN	C.R.	AIR	SPK ADV AS RCD	SPK ADV AS TST	ODOM MILES	AMB TMP	BAROM	HUM	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
521	28	LGA 238A3	F	Y	8.0	Y	+15	+15	15580	70	29.36	50			83.0	86.0	85.5	84.0	79.0	L	L	L	L	L
523	28	LGA 238A3	F	Y	8.0	Y	+15	+15	21328	70	29.28	50		85.0	87.0	89.0	87.0	85.0						
517	28	NFS F50A4	F	Y	9.5	Y	+ 6	+ 6	15606	70	29.55	50			84.0	86.0	89.0	85.0	84.0					
505	5	NTLH 450A4	F	Y	8.6	Y	+ 6	+ 4	10563	70	30.15	56			L	76.0	80.0	L						
507	5	NTMH 450M4	F	Y	8.6	N	+ 6	+ 6	7282	75	30.48	48		91.0	92.0	89.0	87.0	87.0	87.0	86.5	86.5	86.0	85.5	85.0

The columns 1000–3750 are grouped under the heading PRIMARY R.F. OCTANE NUMBER REQUIREMENTS, AT RPM.

TABLE J-II

PRF SPEED RANGE CALCULATED DATA - 1983 SELECT MODELS

Model Code		Engine rpm 1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750
NGA 238A3/HGA 238A3/	Mean	84.0	84.9	85.9	86.7	85.9	84.1	82.6	82.5	80.5	79.0	79.5	-
IGA 238A3/LGA 238A3	SD	-	1.27	1.37	2.21	2.48	2.76	3.09	1.70	1.47	1.41	-	-
	N	1	2	10	17	17	15	9	6	4	2	1	-
NJP F20A3/LJP F20A3/	Mean	-	-	93.0	90.4	90.6	89.5	90.1	90.1	89.2	88.5	87.8	86.6
GJP F20A3	SD	-	-	4.24	3.33	2.78	2.91	2.90	2.65	2.60	2.72	2.54	2.71
	N	-	-	4	10	10	13	15	17	17	14	13	11
OA4 216A3/MA4 216A3	Mean	84.0	89.6	90.3	90.3	89.8	88.3	89.1	88.5	88.0	87.4	86.8	87.1
	SD	-	4.13	3.42	3.48	3.28	2.71	2.22	2.83	3.89	4.02	3.72	3.16
	N	1	6	6	6	6	8	6	6	5	5	5	4
OD3 238A3/OD3 238A4/	Mean	86.2	84.1	85.7	85.7	85.7	84.8	84.8	84.7	84.7	85.3	84.3	83.0
MD3 238A3/OE3 238A3/	SD	2.62	3.33	2.96	2.33	2.48	3.36	3.15	2.88	2.48	2.52	2.25	1.34
OE3 238A4/ME3 238A4	N	2	7	9	10	11	11	10	9	6	3	3	2
PKC 222A3/KKC 222A3/	Mean	84.3	85.8	85.2	85.4	86.1	86.2	85.0	84.5	84.3	83.4	82.8	82.3
DKC 222A3/KEC 222A3/	SD	1.06	1.06	1.75	4.05	3.22	2.84	2.77	3.48	2.60	2.69	2.70	2.52
DEC 222A3	N	2	2	7	10	14	16	16	15	13	13	12	11

SD = Standard Deviation; N = Number of Observations

FIGURE J-1

PRF SPEED RANGE OCTANE NUMBER REQUIREMENTS

1983 SELECT MODEL: NGA 238A3/HGA 238A3
IGA 238A3/LGA 238A3

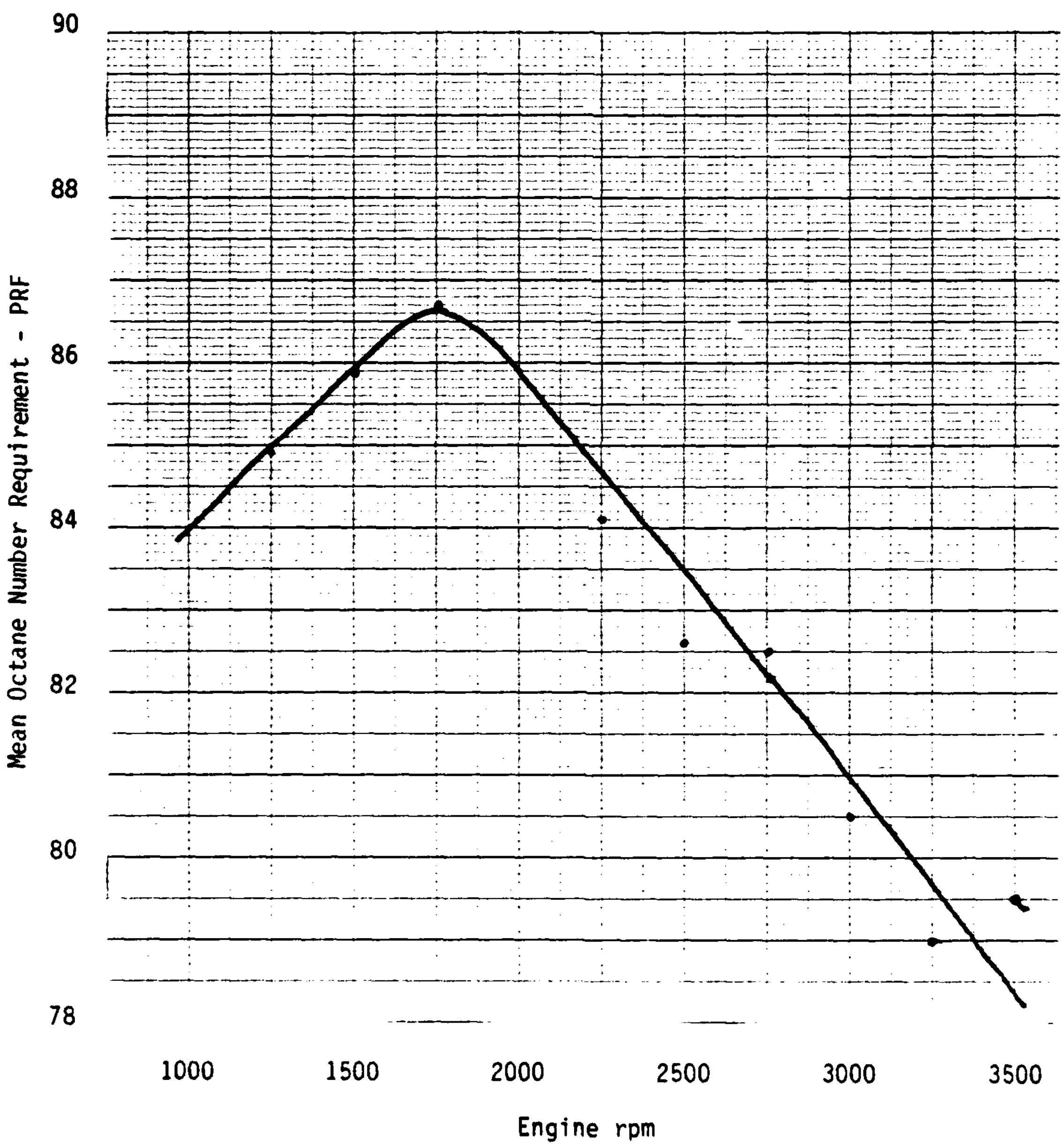


FIGURE J-2

PRF SPEED RANGE OCTANE NUMBER REQUIREMENTS

1983 SELECT MODEL: NJP F20A3
LJP F20A3
GJP F20A3

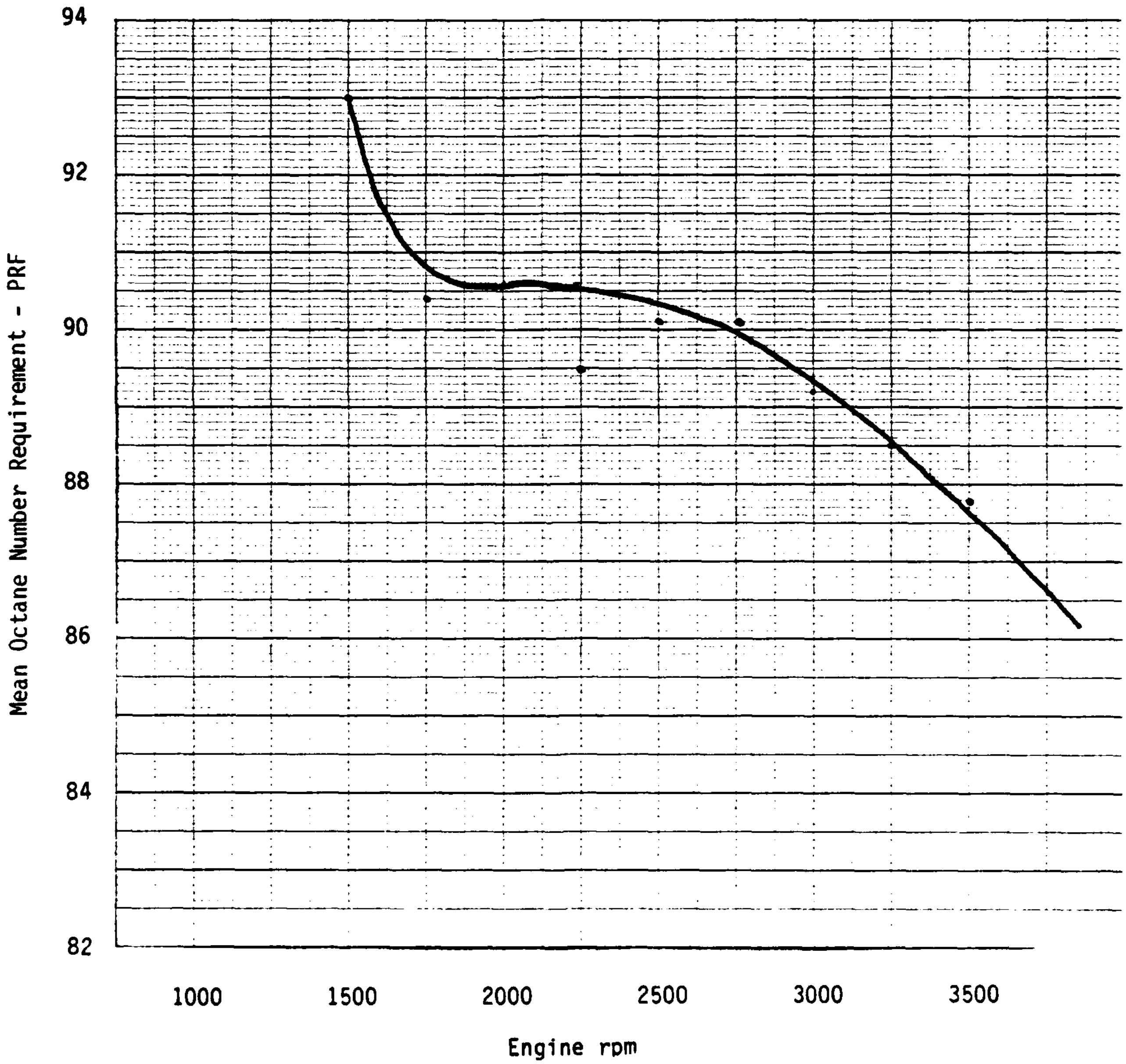


FIGURE J-3

PRF SPEED RANGE OCTANE NUMBER REQUIREMENTS

1983 SELECT MODEL: OA4 216A3
MA4 216A3

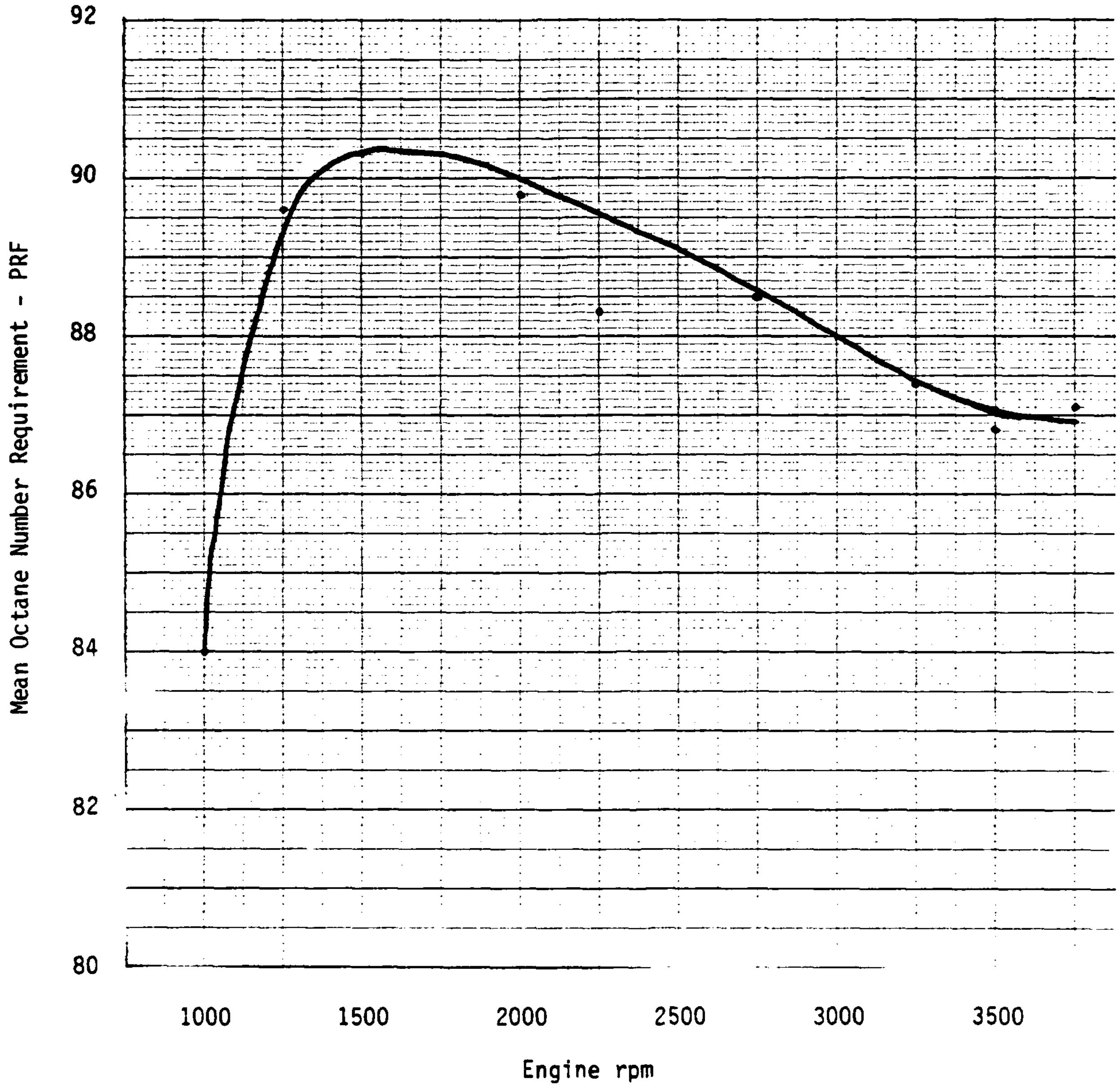


FIGURE J-4

PRF SPEED RANGE OCTANE NUMBER REQUIREMENTS

1983 SELECT MODEL: OD3 238A3/OD3 238A4
MD3 238A3/OE3 238A3
OE3 238A4/ME3 238A4

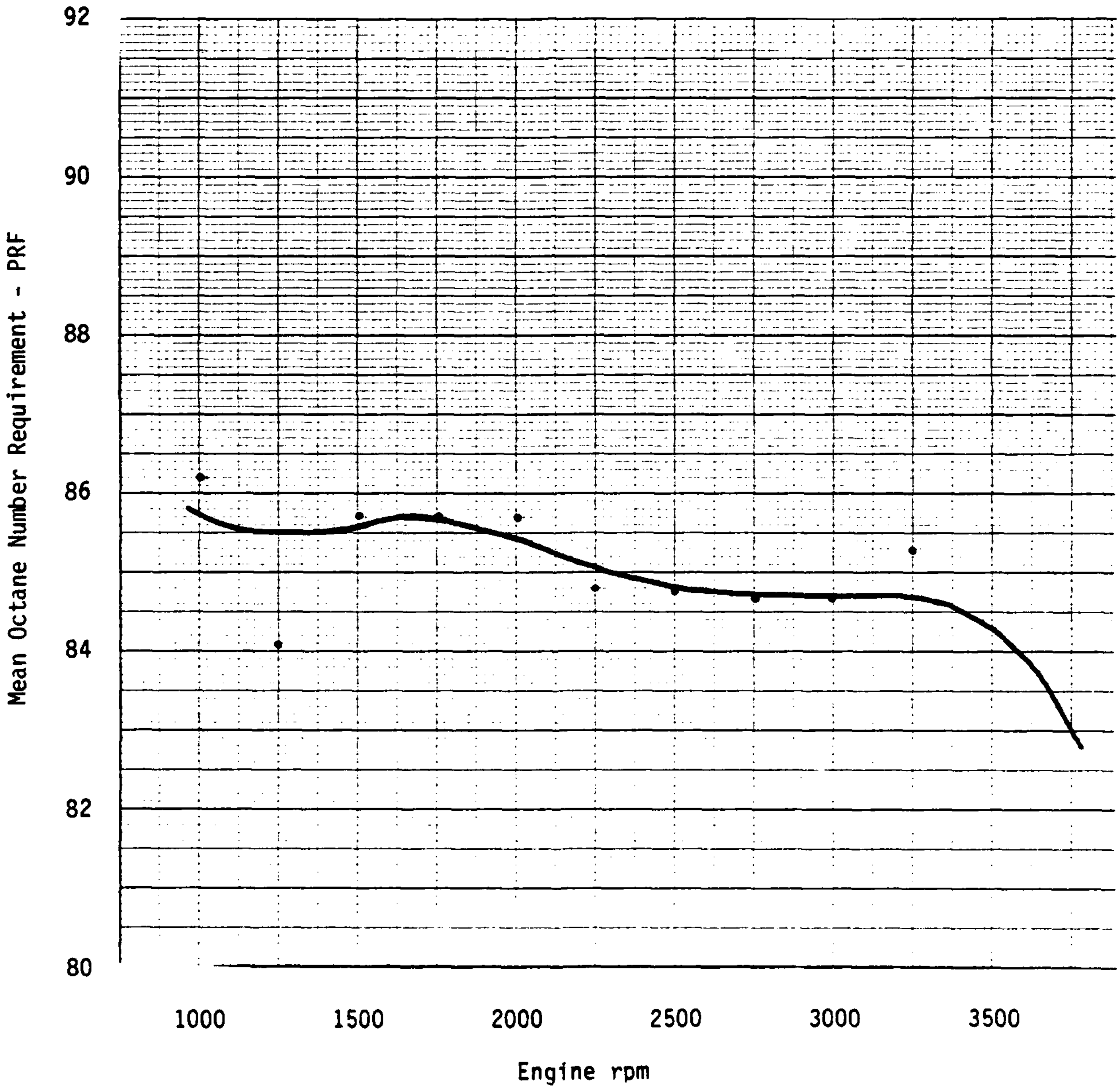
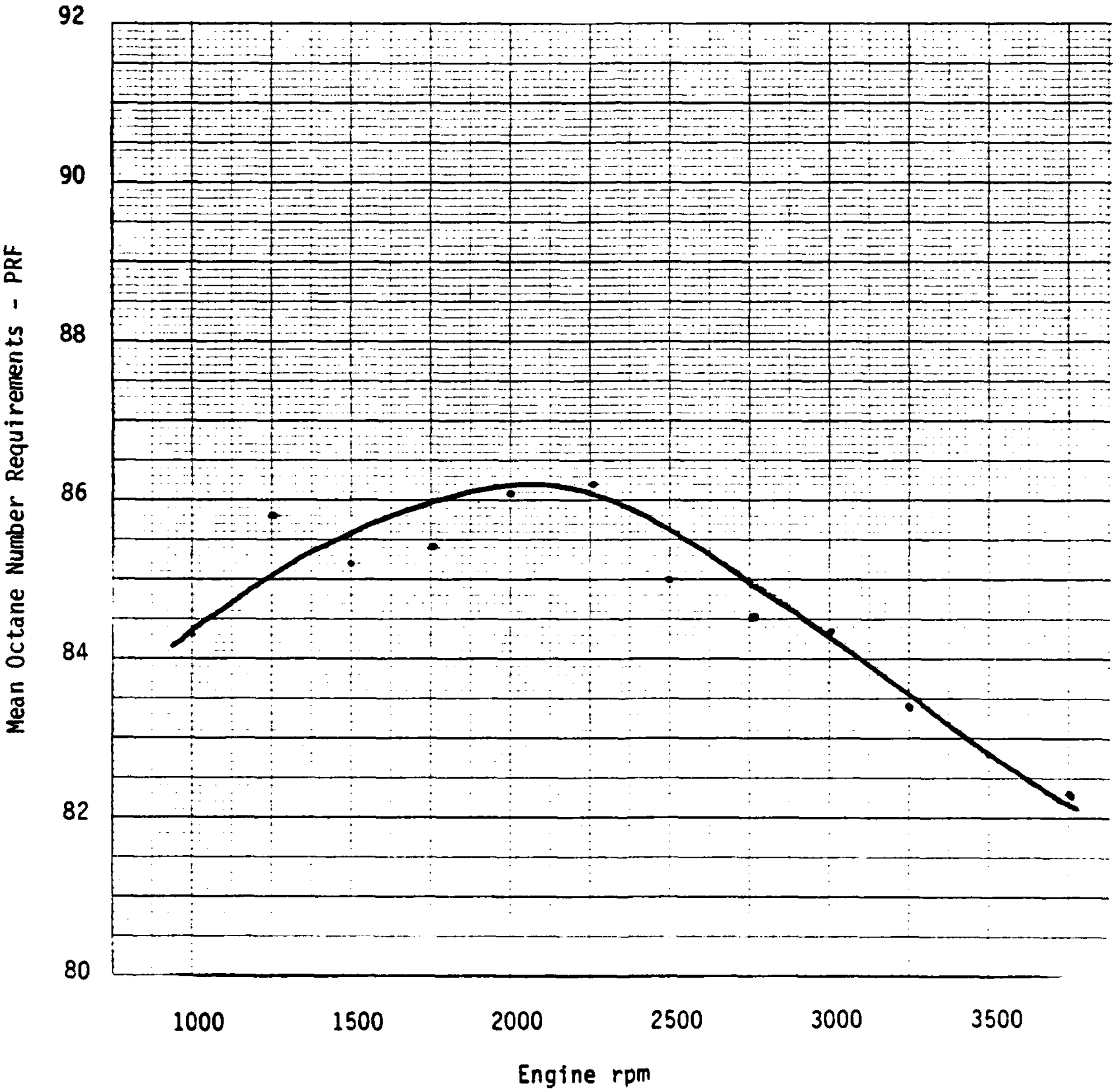


FIGURE J-5

PRF SPEED RANGE OCTANE NUMBER REQUIREMENTS

1983 SEL:CT MODEL: PKC 222A3/KKC 222A3
DKC 222A3/KEC 222A3
DEC 222A3



A P P E N D I X K

GEAR POSITION FOR
MAXIMUM OCTANE NUMBER REQUIREMENTS

TABLE K-I

THROTTLE/GEAR POSITION FOR 1983 MAXIMUM

FBRU OCTANE NUMBER REQUIREMENTS

Throttle Position	Transmission Type & Gear		No. of Vehicles	% of Vehicles
---Automatic Transmission---				
Maximum	4-Speed:	4th	35	11.9
		3rd	25	8.5
		2nd	5	1.7
	3-Speed:	3rd	131	44.4
		2nd	50	16.9
Part	4-Speed:	4th	7	2.4
		3rd	3	1.0
	3-Speed	3rd	39	13.2
			295	100.0
---Manual Transmission---				
Maximum	5-Speed:	4th	46	52.3
		3rd	10	11.4
		2nd	1	1.1
	4-Speed:	4th	13	14.8
		3rd	4	4.5
Part	5-Speed:	4th	12	13.6
	4-Speed:	4th	2	2.3
			88	100.0

END

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